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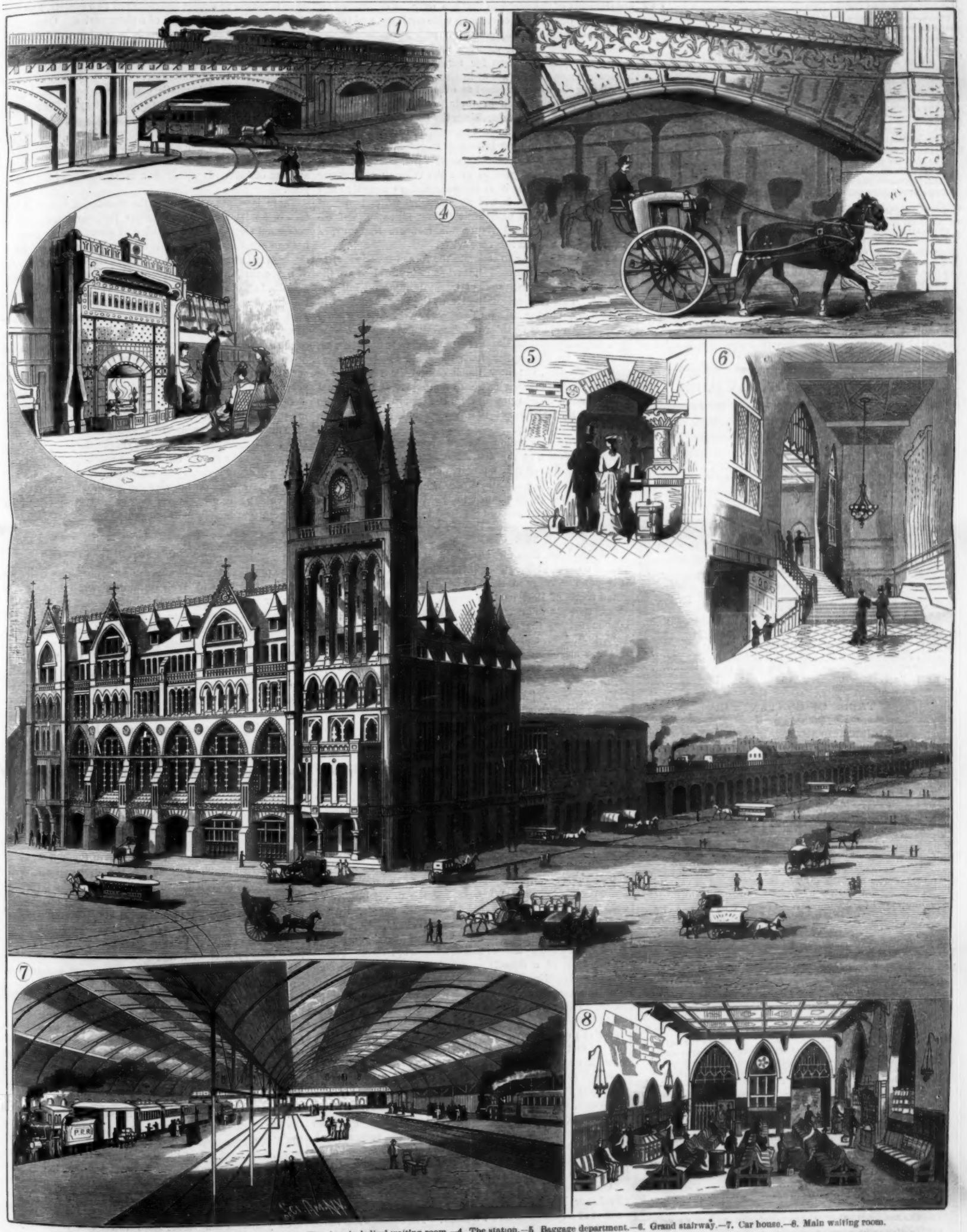

1. Eighteenth Street crossing.—2. Hansom cab system.—3. Fireplace in ladies' waiting room.—4. The station.—5 Baggage department.—6. Grand stairway.—7. Car house.—8. Main waiting room.

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NEW YORK, SATURDAY, MAY 12, 1883.

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(Illustrated articles are marked with an asterisk.)

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THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 384,

For the Week ending May 12, 1883.

Price 10 cents. For sale by all newsdealers.

THE FORCE OF THE WIND.

The recent cyclones which have swept over some of our Western States forcibly call to mind how meager our knowledge of them is, and also hint the importance of systematically studying their origin, direction, and effect. The force exerted by them, as a factor entering into the calculations of the architect and engineer, should make an intimate acquaintance with the laws governing them imperative. We are fairly familiar with their form and reasonably certain of the causes which create them, but of the other and to us infinitely more important part of the question—the pressure—we are lamentably ignorant. Whether we will ever be able te retard their progress, diminish their power, or successfully divert them from objects which we do not wish endangered, are elements of the problem that can only be discovered by methodical observation covering a wide territory, and taking into consideration the topographical and atmospherical influences tending to their creation and continued existence.

There are but two plans for measuring the pressure of high winds: one by the aid of instruments, and the other by calculating the force required to overturn, or demolish, obstacles which have stood in their path. The first plan is only of little practical value, since the best anemometers are either destroyed, or rendered inoperative, before registering the pressures we are most interested in obtaining. The perfect anemometer has yet to be constructed, and it matters not whether it is designed to give the velocity or pressure of the wind, so long as it is accurate and so sensitive and quick responding that it will register what we call gusts of wind. It should also unerringly follow all changes of direction in the wind, and, if possible, measure the upward or lifting power when this case arises.

It is a simple matter to estimate the force expended after a body has been overturned, but when costly bridges are the objects operated upon, the experiment is anything but economical. This plan will only give us the force necessary to do the work, but the amount in excess of this we can only guess at. To illustrate this: A locomotive was overturned in 1871, the calculated maximum force required to do this being 93 pounds to the square foot; the wind exerted a force greater than this, but how much cannot be found. The fact that a storm passes between two points at a rate that will produce a certain pressure to the square foot is of no assistance, since it is not the average but the maximum pressure we seek after.

That the whole question of wind pressure is shrouded in darkness is shown by the difference in practice among the leading engineers of this country, and also among those of other countries, and the allowances made for wind pressure, whether 20, 30, or 50 pounds to the foot, are the results of individual study, not of combined research.

THE COMETS OF 1883.

This has been, thus far, an unsatisfactory year for the advent of comets, although one-third of its course is completed. It is not according to the law of averages, that after the grand comet of 1882 another comet of similar dimensions should speedily follow. The great comets of a century may be counted on the fingers. Such are those of 1812, 1843, 1858, 1861, 1880, and 1882. It is altogether probable that the like may not be seen again before the close of the present century, unless the comet of 1812 makes its predicted return.

Every year has its cometic history, and the portion of 1883 that has already elapsed is not exceptional in this respect. Early in January reports came from Panama and from officers of the steamship City of Savannah of a comet visible southeast of Orion, with its tail pointing toward that constellation. This proved to be the shadowy form of the great comet of 1882, dimly visible as on swift pinions it winged its way to parts unknown. Observers were deceived by the change in the direction of the tail, which was only apparent, being due to the change in the position of the earth, and in the altitude of the sun.

On the 21st of January the astronomers at the Mexican Observatory of Puebla announced the discovery of a comet near the planet Jupiter. They were not very well booked up in the positions of the nebulæ, for the newly discovered comet proved to be the well known Crab nebula, situated near the star Zeta in the constellation Taurus. In a small telescope it appears as a nebulous light of oval form, but in Lord Rosse's huge reflector at Parsonstown, Ireland, it takes on the form of a densely crowded cluster, with claw-like branches streaming from the oval boundary, giving it an appearance resembling the animal from which it derives its name. This nebula was so near Jupiter during the winter that planet and nebula were seen in the same field in the finder of the telescope.

The first genuine comet of the year took its place on cometic records on the 23d of February. It is not of much account as to size, but lays claim to distinction from the fact that it was discovered almost simultaneously by two observers, Professor Brooks, of the Phelps Observatory, and Professor Swift, of the Rochester Observatory. Professor Swift discovered the comet at 7 o'clock in the evening, and, as soon as possible, telegraphed the event to several other astronomers and to Professor Pickering, of Harvard University, to be cabled to Europe.

On his return to the observatory he found a telegram from Professor Brooks announcing the discovery of the same comet at a quarter before 7 o'clock. The comet when found was in the constellation Pegasus, near Beta Pegasi, and was a bright and beautiful telescopic object. Its faint tail was half a degree long, and it was moving slowly eastward. Technically it receives the name of Comet *a* 1883, but out of compliment to the two discoverers it is also called the Brooks-Swift comet. On the evening of the 1st of March its spectrum was examined at Lord Crawford's Observatory, Dun Echt, Scotland, and found to be fairly bright, and to consist of the usual three bands. Its ephemeris is given in the *Science Observer* to the 23d of May, but as its light is now less than one-twentieth of the light at discovery, and it is traveling rapidly south, its visit to our domain is virtually ended.

Although there is great uncertainty in regard to the number and size of the comets that will suddenly look down upon us from celestial heights during the remainder of the year, there is reason to expect the return of two comets, known as periodical comets or comets of a short period. One of them is D'Arrest's Comet, discovered by Professor D'Arrest on the 27th of June, 1851, having a period of six and a half years. It was last seen in 1877, and is expected to reappear in October of the present year. It was announced on the 4th of April that D'Arrest's comet had been picked up by Dr. Hartwig, of the Strassburg Observatory. The supposed comet proved to be a new nebula.

The other expected comet is known as Tempel's Comet II., and has a period of five and a quarter years. It was discovered on the 3d of July, 1873, and observed again in the autumn of 1878. It will be due in November of the present year.

There is a possibility that the wonderful comet of 1812 may make its reappearance before the year closes. Encke computed for this comet a period of about seventy years. If his computation be correct, it may suddenly flame forth in the heavens at any moment. A more rigorous investigation of the comet's path has recently been completed by MM. Schulhof and Bossert, that gives a period of about seventy-three years. They have fixed upon the 3d of September, 1884, for the next peribelion passage. But comets, with their perturbations, retardations, and accelerations, are the most unreliable members of the system. It is not impossible that in spite of the wise calculations of the mathematicians the comet of 1812 may steal a march upon us before the present year closes, looming unexpectedly from the star depths, sweeping the sky with its tail, millions of miles long, illumining the sky with its brilliant nucleus, and rushing toward the sun with an awe-inspiring and inconceivable velocity. If the celestial visitor appear this year or the next, it will not only delight the eye by the brilliant spectacle it will present, but it will score a victory for astronomers, who have tracked the lonely traveler on its viewless path, mastered the laws that rule its erratic course, and successfully predicted its safe return to the clime of the sun.

THE DECAY OF BUILDING STONES.

The practical scientific study of building stones, their comparative merits, and their durability when subjected to peculiar local or atmospheric influences, has yet to be made. The failure of some stones to resist fire, discolorations, and the disintegrating effects of the emanations from manufacturing centers has resulted in their decreased use and the substitution of brick. On the 30th ult., Dr. A. A. Julien, of Columbia College, read the second part of a paper on the Decay of Building Stones, before the New York Academy of Science. His remarks were based on observations made in this city and adjacent places.

The principle that stones are more lasting when laid on bed is clearly demonstrated in the case of all the building stones. After a structure has been erected a few years, there is no difficulty in dividing the stones laid on bed from those laid on edge, as the laminations in the latter become distinctly marked; and in some kinds this can be discovered immediately after completion, as the more porous layers dry first, thereby giving the stone a striped appearance.

In brownstone a deep decomposition was noted even when laid on bed; when exposed to the heat of the sun, the change is more rapid. The attack of the destroying agents is favored by imperfect jointing, which opens a back entrance. The discoloration in Nova Scotia sandstone might be prevented if the surfaces were vertical and placed out of reach of dripping. It is too soft for lower portions of buildings, and receives and retains the street dust. Ohio sandstone resists our climate well, and when used in Western cities is discolored but not disintegrated. There are but few limestones in the city, and the decay of Westminster Abbey, London, should warn us of the danger of using fine grained limestone until we are satisfied of its durability in this climate. The decay of marble is first shown by its becoming pitted; those set on edge show the more rapid decay. Granite shows pitting, the hornblende being first attacked. The south and west sides of the Tombs show decay, while the other sides are intact. The sides affected are exposed to the sun's rays.

Dr. Julien came to the following conclusions in regard to the life of stones, defining life as the period during which the stone presented a decent appearance. Coarse brownstone, best used out of the sun, from five to fifteen years. Laminated fine brownstone, from twenty-five to fifty years. Compact fine brownstone, from one to two centuries. Nova Scotia stone will probably last from fifty to one hundred years. Ohio sandstone, the best of the sandstones, one hundred years. Caen stone, from thirty-five to forty years. Coarse dolomite marble, forty years; fine marble, sixty years; pure calcareous marble, from fifty to one hundred

years. Granite, from seventy-five to two hundred years, according to variety.

Bluestone is as yet untried, but will prove a good building material. Some of the best building stones in this country have not yet been brought to this city.

Some of the causes that produce decay in stones are, first, solutions and hydrations of the stone and the heat of the sun.

FALSE WORKS.

False works may be defined as those works which are necessary, as aids, in building permanent structures, and a knowledge of the principles underlying their construction is essential to success. The step ladder which enables a man to place a nail in a wall ten feet from the ground is as much a false work as the scaffolding on a building. Both are only temporary, and after having lent their assistance toward accomplishing certain objects, are removed. There are three main considerations that should compel close attention and careful study: being, as the name implies, false works, they should be built upon as economical a plan as possible; the system, or plan, should be simple in all its details, easy of erection and easy of demolition; and, finally, they should possess strength sufficient for any load they may be called upon to bear. The conditions are so varying, every change in the plan of the structure demanding an alteration in the false work, that no fixed rules can be laid down. Almost every builder has methods of his own, little secrets of his trade learned by years of experience. But in scaffolding for large buildings, while the question of safety should never be lost sight of, the timbers ought to be so used as to permit of their being sold after the work shall have been completed. When allowable, they should be kept in marketable lengths and as free from disfiguration as is consistent with the work in hand. Timber of straight grain, clear, and of good kind, is cheaper in the end than that not having these qualities, although the first cost may be more. The architect when computing his strains figures upon the strength of the best timber, but the builder in his scaffolding is sometimes forced to use timber that is imperfect, and it is then that his past practice comes to his aid. The quality of the material changes the whole aspect of the affair, and its successful use, whether good or bad, can only be learned by actual handling.

One of the most important divisions of false works is that in bridge erection, and it is here that peculiarities of education are best illustrated. A long span bridge over a deep ravine or river requires an elaborate system of false works, and a new factor in the problem now comes forward. In many locations it is necessary to so proportion them that they will resist wind pressure and be stable in a gale.

It is not every engineer who can design a first-class bridge, and then go and erect it in unfavorable situations. Every year the designer and erecter are occupying more widely divergent and independent stations, similar to the architect and builder. As a whole, the science of false works, which are used to-day and destroyed to-morrow, is becoming one of great importance, increasing in the same ratio as the magnitude of the works, and it is becoming a distinct profession, demanding specialists to master its ever-varying conditions.

THE LOAD OF SHAFTING.

Shafting, pulleys, and hangers are necessary intermediates between the motor and the moved. On their integrity depends the very existence of establishments driven by steam or water power, and the care in calculation and attention in making and placing them is properly fully as great and exactive as in the build and choice of tools and machinery that make the ultimate product. The shafting must be strong enough to sustain not only the weight of pulleys, but to resist the strain of belts without springing, and also to sustain the weight between supports placed at considerable distances on a main line ten or twelve feet. If the shaft springs in use, the boxes soon wear out and the journals cut, and the friction is excessive. If additional bearings are placed, it is at the expense of additional friction. The elements of size of shafting and distance between bearings are parts of the problem of a layout of the shafting for an establishment that do not appear to receive as much attention as their importance deserves. The principal object of the millwright is to have his shafting stiff enough to resist all the strain and pull to which it may be subjected, and have plenty of material and weight over and beyond that limit. But all the weight, necessary and unnecessary, must be kept in motion by the prime mover at as great an expense in proportion to the energy exerted as the producing machinery.

The revelations of the dynamometer and the steam engine indicator are astonishing in their recorded results of tests made with "all machinery on" and "all machinery off." In one establishment, employing steam to the amount of 220 horse power, the disgusted proprietor declared, when the results of an examination were given him, that he "was paying more for turning shafting and running belts than for producing work." The statement was somewhat exaggerated, but a very large proportion of the force of the prime mover is expended in the power used in running the intermediates of shafting, pulleys, and belts.

Once this proportion was much greater than now. In the memory of many mechanics, square shafting was universally used, making an addition in weight of nearly one-third, without corresponding addition of strength; for the resistance to bending of a square bar across its small diameter is scarcely greater than that of the round bar of the same diameter.

The general introduction of round, turned bars was a great relief to this load of unnecessary iron; and the tendency of improvement has moved also in the direction of lightening the weight of pulleys, and balancing them. Our cast iron pulleys are much lighter than formerly, and latterly wrought iron pulleys have been introduced, having, in addition to the advantages of being already balanced and being stronger than cast pulleys, that of being very much lighter. Wooden pulleys of very neat construction have been placed on the market, and paper has also been pressed into service (and shape) as pulleys.

Perhaps these improvements in pulleys have reached their climax; but there may be room for improvement in shafting. It is doubtful if the entire strength of the diameter of a two inch solid shaft is ever required where a shaft of that size is placed. Probably the trial strength of the shaft, in support of weight and resistance to the pull of belts, would not be practically diminished if the shaft was cored by the removal of the central diameter of one inch. This would leave the walls of the shaft half an inch thick, and would reduce the weight of a line of one hundred feet from 1,060 lbs. to 795 lbs. If still greater strength was required, the diameter of the shaft might be increased to two and a quarter inches, and be cored one and a quarter inches, leaving half inch walls, and the two and a quarter inch shaft, hollow, would then weigh less than the two inch, solid. But it is probable that a two inch shaft with a core of one and a quarter inches would serve the purposes of the solid two inch shaft. This would leave walls of three-eighths of an inch and reduce the weight of a line of one hundred feet from 1,060 lb. to 645 lb. These estimates are not intended to be exact, but they suggest the possibility of reducing the weight of our running shafting, with the result of a material reduction in expense of running, and a consequent increase of profit in result. Very easily managed tests could be made to ascertain the relative strength of the solid and hollow shafts. There is plenty of hydraulic tubing in the market that in its proportions would serve for these tests, obviating the necessity of preparing specimens specially for the purpose.

DISINFECTION VS. DISINFECTANTS.

So much has been said about disinfectants within the last ten years that it would be superfluous for us to increase the bulk of literature on that very attractive subject. We have no new kind of disinfectant with unpronounceable name and of surprising efficiency to introduce to our readers, yet a few words of caution against the use of those already known will not be out of season just now.

For many years sanitarians extolled the virtues and recommended the use of all sorts of disinfectants, while at present the tendency is to undervalue and decry the use of nearly every kind of disinfectant. Is there less need of disinfection, or have the old means proved worthless?

Let us first consider the object aimed at in their use. When, where, and why is disinfection needed? Take first the air we breathe; pure air, the normal mixture of oxygen and nitrogen with its 0·04 per cent of carbon dioxide and still smaller traces of ammonia. The out-door air of sea and land is healthful and invigorating. Provided its temperature is neither too high nor too low, it does not injure our bodies, externally or internally. Those tribes that live in this free open air suffer only from wet and cold, more rarely from heat. But even out-door air, in some localities, and at certain seasons, contains other and less wholesome substances. Miasm, whether it be an organized ferment, a living germ, or, what is very improbable, some peculiar gaseous substance, is a natural product. It may be found where the foot of man has never trod, nor his hand created the conditions for its generation, as well as in places where the newly upturned soil shows that civilization is pushing her conquests, or where the iron road has damned the natural streams, and where factories or inundations have flooded extensive tracts of fertile land.

Against this subtle poison, whatever it may be, we have, unfortunately, too little protection. King Carbolic is as powerless against its ravages as was King Canute against the advancing tide. Perfect security is only found in flight; where this is impossible, means should be taken to remove and destroy the cause, which is often quite as difficult, and can only be accomplished by the State or general government. The noble cities of the West, and their cousins on the Rhine, have suffered untold hardships from recent freshets, and scarcely smaller dangers threaten when the vernal sun shall fall upon these river-soaked towns and develop in the nidus thus prepared those malignant germs of death.

But while our sympathy goes forth to them, let us look at our own back-yards, our sinks, and cesspools, and even our cellars, to see if we have been preparing hot-beds for the propagation of like evils. Whatever accumulation of vegetable or animal matter has been formed during the winter must be removed before the summer's sun falls on it. Do not rest with sprinkling over it some disinfectant, good or poor, but consign it either to the flames or, if in the country, to a compost heap at a safe distance from the house and well.

Next to malaria and the dangers that arise naturally from the spontaneous decomposition of ordinary refuse, is that which may result from improper care and disposition of effete matter, which may poison both air and soil. The evil effects of sewer-gas are largely due to these products, although, in large towns, the danger of actual infection is superadded.

Against all of the above the usual disinfectants are nearly or quite useless. Their supposed value rests upon an entirely false basis. Among the products of putrefaction and decay there are some gases, mostly sulphur compounds, of repulsive odor. This is a most fortunate circumstance in one respect, as the odor not only serves to make its presence known, but prompts the individual either to flee from it or to employ ventilation for comfort's sake. Too many people think that the only deleterious products are those that offend the nostrils, hence they are satisfied when they have destroyed the odor. That this may be accomplished without much benefit in any other direction will be evident upon a moment's consideration. Carbon disulphide, a poisonous substance, the vapors of which produce headache and vertigo that may result in death, has, usually, a repulsive odor, but it is not difficult to deodorize it without effecting its other properties. Deodorized alcohol is no less a poison than it was before.

Then, again, most disinfectants, like carbolic acid, have an odor of their own which masks the other smell instead of destroying it. The essential oils, burnt coffee, scorched rags, etc., act in the same way. Metallic salts absorb and decompose sulphureted hydrogen, and hence are true deodorizers, and to that extent are of some value. The objections to their use are as follows: With the exception of iron salts they are poisonous, and accidents are liable to occur. Then they produce a false sense of security, as we are apt to forget that the gases retain their poisonous properties long after the odor is gone. From time to time the popular press, and even some semi-scientific papers, recommend as a disinfectant a solution of lead chloride in an excess of sodium chloride. The lead, of course, absorbs the sulphureted hydrogen, and thus acts as a deodorizer, and a poisonous one at that. Occasionally some ignoramus, confounding chlorides with hypochlorites, recommends the use of calcium chloride obtained from the action of common salt on quicklime, or lime-water. The chlorine in this compound, like that in the lead salt, is so firmly bound that it has no value as a disinfectant. The value of dead oil and crude carbolic acid is in part due to its bad smell, which induces people to throw open the windows and admit nature's disinfectant, atmospheric oxygen.

The third case in which it becomes desirable to disinfect the air itself is in hospitals where contagious and infectious diseases are treated. As these are supposed to be due to minute organisms, or germs, disinfection means destruction. This can only be effected by contact. A current of air loaded with the germs of a disease will float unchanged over the surface of a dish full of chlorides, of iron salts, or even of carbolic acid. Chlorine, bromine, ozone, and sulphur dioxide are more efficient, owing to their power of mingling with the germs as they are wafted over our heads. It is probable that if sufficiently abundant they actually destroy the germs, while at the same time they decompose the sulphur compounds, and thus prove to be true deodorizers, but they are themselves irrespirable in this state of concentration.

The disinfection of houses, rooms, or clothing used by the sick is less difficult. In some cases it is cheaper to burn them; in other cases heat, the most effective of disinfectants, can be applied, either wet or dry, with good effect. Solutions of poisonous substances, from carbolic acid to corrosive sublimate, are frequently employed with good effect, but antiseptics in general have very little effect upon bacteria. Fire, on the other hand, consumes bacteria, as well as other germs, and it is unlikely that any poisonous gas would escape destruction if passed through fire, the oxides of carbon excepted.

Le Bon says that the volatile alkaloids which are formed during the advanced stages of decay are very violent poisons. He compares them with prussic acid and coniine in in their effects. The dangerous properties of the gases that escape from graves and vaults are due, he thinks, to these alkaloids, and not to microbes, hence disinfectants of every sort, even if they could be brought in contact with these gases, would be of no avail.

As disinfectants mostly fail to disinfect, no reliance should be placed on them; suitable precautions should be taken to render their use unnecessary; impure air should never be breathed, nor should preventable causes be allowed to pollute the air. Decay and decomposition can usually be prevented by the use of antiseptics, if in no other way, for it is much easier to prevent putrefaction from setting in than to check it after it has once begun. H.

The Proposed Sahara Sea.

M. De Lesseps reports favorably on the proposed Sahara Sea scheme. Soundings 73 meters deep have shown the existence of nothing but sand. The African inland sea might easily be made, with the aid of 100 excavators, representing the work of 100,000 men. M. De Lesseps has met with the best reception from the Arab soldiery and population. On the 3d inst. he arrived at Biskra, having completed a survey of the country between Gabes and the Marsh Lakes. He declared that the soil will allow of the excavations necessary to connect the lakes with the Mediterranean, that the works will present no extraordinary difficulty, and that the concessions asked for with regard to the forest and adjoining lands will make the scheme remunerative and wholly independent of State aid, subvention, or guarantee.

Practical Hints about Glasses.

Persons finding their eyes becoming dry and itching on reading, as well as those who find it necessary to place an object nearer than fourteen inches from their face to read, need spectacles.

Persons under forty years of age should not wear glasses until the accommodating power of the eyes has been suspended and the exact state of refraction determined by a competent ophthalmic surgeon.

The spectacle glasses sold by peddlers and by jewelers generally are hurtful to the eyes of those who read much, as the lenses are made of inferior sheet glass and are not symmetrically ground.

No matter how perfectly the lenses may be made, unless they are mounted in a suitable frame and properly placed before the eye, discomfort will arise from their prolonged use.

There are three systems of grading spectacle lenses: the English, the metric, and the Prussian. Those made to supply the demands of the trade in this country are carelessly made, and are poor imitations of either the English or the metrical system. The metrical scale has no English equivalent, is not graded by any uniform rule of dividing the inter focal spaces, and is therefore unsuited to the exacting demands of science.

Persons holding objects too near the face endanger the safety of their eyes and incur the risk of becoming near-sighted.

The near-sighted eye is an unsound eye, and should be fully corrected with a glass, notwithstanding the fact it may need no aid for reading.

The proper time to begin wearing glasses is just as soon as the eyes tire on being subjected to prolonged use.—*Medical Herald.*

Putting Pelagic Animals to Sleep.

The *American Naturalist* says Dr. Fol, of Geneva, has made the important discovery that cœlenterates and echinoderms may be rendered insensible and kept so for hours, and even days, without injury, by saturating the water with carbonic acid. The containing vessel must, of course, be hermetically closed. The animal at once becomes insensible and motionless, but preserves its natural appearance, and recovers at once when again placed in pure sea water. This method may be used not only for obtaining life-like photographs, but also, as Dr. Fol suggests, for transporting animals alive. Fishes and mollusks do not survive this treatment, and crustaceans for only a short time.

Dr. Fol tried various narcotics, but found that small doses would not bring the animals to rest, while large doses acted as poisons. The same proved true of tobacco smoke and aqueous solutions of ether, chloroform, and ethyl bromide. Sulphydric acid and carbonic oxide gave satisfactory results in only a few cases.

MODERN SYSTEMS OF HEATING AND LIGHTING.

The accompanying engraving, taken from one of our London contemporaries, shows a new design for a heating apparatus, which, it says, is becoming successfully introduced in England.

By an arrangement of a series of water pipes within the shell of the stove, the utmost heat is obtained from the smallest consumption of fuel. The fire is entirely exposed to view, as in an ordinary grate.

COMBINED GRATE AND HOT WATER RADIATOR.

Photographic Hints and Wrinkles.

Citro-oxalate Developer.—The following developer is recommended for dry plates made with bromide of silver as well as chloride emulsions No. 1 consists of 70 parts of potassium citrate, 20 parts of potassium oxalate, in 168 parts of water. No. 2 consists of 30 parts of sulphate of iron in 168 parts of water. For use, mix equal volumes of each solution. The solutions will keep a long time with vaseline oil on the surface.

Alkaline Developer for Gelatine Plates.—The following is said to give a strong and unfogged negative with short exposure. Equal parts of a cold saturated solution of sodic bicarbonate and 1 part of ammonia solution (1 to 4) are mixed. A solution of pyrogallic acid is made in the proportions of 1 to 160, and a few drops of the above alkaline solution added.

Another Pyro-developer.—Dissolve 60 grammes of pyrogallic acid and 20 grammes of boric acid in 600 c. c. of water. Another solution is made of 120 grammes of ammonia and 15 grammes of ammonium bromide in 600 c. c. of water. A third solution contains 100 c. c. of chemically pure glycerine in 800 c. c. of water. When developing a plate, 4 c. c. of the pyro solution is mixed with 4 c. c. of ammoniacal solution, and both poured into 60 c. c. of the glycerine solution.

Nitro-glycerine in the Iron Developer.—The following is said to be an excellent developer for wet collodion plates. Dissolve 10 grammes of sulphate of iron in 160 c. c. water, and add 10 grammes of glacial acetic acid and 10 grammes of a 1 per cent alcoholic solution of nitro glycerine.

MICROSCOPES were invented by Jansen in Holland about 1590, by Fontana in Italy and Drebbel in Holland about 1621.

AUTOMATIC EXTINGUISHER FOR KEROSENE LAMPS.

The engraving shows a lamp burner provided with means for extinguishing the flame of the lamp in case it should be accidentally upset. The main parts of the burner may be of any approved construction. Extinguishing plates are hinged under the dome near the wick tube, and are provided with arms, which project outwardly, as shown in the engraving, and pass through the diagonal slots made in a plate formed with the stem, which passes down through the flange of the burner, where it is turned to form a hook for the

AUTOMATIC EXTINGUISHER FOR KEROSENE LAMPS.

attachment thereto of the upper end of the rod, which reaches down to the base of the lamp and rests upon the table or other support of the lamp when the lamp stands upright, and is of such length relative to the height of the lamp, that when the lamp is in upright position it lifts the slotted plate, causing it to open and hold open the extinguishing plates, as shown in the engraving. The rod is provided with a coiled spring, which, should the lamp be upset, serves to force the rod downward. This will draw downward the slotted plate and close the extinguishing plates over the wick, and thus instantly extinguish the flame. A stud serves also as a means by which the rod may be held from downward movement by one finger of the hand when the lamp is lifted off from the table or other support.

The device is cheap, and may be applied to all forms of lamps. Instead of having the rod pass down the outside of the bowl of the lamp, the bowl might be provided with a tube, through which the rod might be passed down to the face of the lamp, and thus conceal the rod.

This invention has been patented by Mr. John B. Greenhalgh, of Blackstone, Mass.

PROF. SOROKIN of the St. Petersburg Medico-Surgical Academy, says that, judging by certain signs he had noticed in several bodies lately examined, there is a possibility of cholera appearing in Russia during the present year.

Quarter Sawed Yellow Pine.

There is no lumber that will shrink so little and wear so long as quarter sawed. This process of sawing is particularly applicable to yellow pine flooring, as such flooring is generally laid where it is subjected to heavy wear. A bastard sawed board, no matter from what kind of timber it is cut, will wear rough, and sliver, if in constant use for flooring or driveways. It would be impossible to conceive of a harder, more durable floor than yellow pine would make if it were quartered. The pitch it contains would give it an advantage over oak, ash, or maple in point of durability. A few of the Southern mill men are beginning to understand the merits of such flooring, and are selecting the few quartered boards that every log sawed the old fashioned way invariably has, and putting them in a grade by themselves. It is a bad way of doing, for the balance of the flooring is depreciated in value, and in fact sometimes almost worthless, for no man who is acquainted with its defects would think of making a floor of it.

It might answer for a floor that is to be kept carpeted, but usually such a floor is made of softer and cheaper wood. The expense of quarter sawing would be considerably in excess of the usual way of manufacture, but the flooring would be richly worth the difference. Quartered oak in the large markets is worth, on an average, $10 dollars per thousand more than clear oak sawed bastard, and there ought to be nearly that difference between the two kinds of yellow pine flooring. A log, if quarter sawed, does not yield as much lumber as if sawed the other way, and sawing it that way is a slower job. Quartered flooring ought to be one of the productions of the Southern mills. Builders should not object paying a third more for it, when they know its beauty and durability are more than doubled as compared with bastard, and every intelligent builder ought to know that such is the fact.—*Northwestern Lumberman.*

Apparatus for Purifying Air.

An apparatus—Stanley's—is now being brought out in London, for the purposes of cooling, purifying, and disinfecting the air of saloons, cabins, hospitals. The system consists in pumping cold water through pipes which are fixed in the ceilings, running the length and across the saloon or ward in an hospital. In these pipes are fixed rods, outside which it is intended that a thin film of water shall trickle down, which will be regulated by a cap fitted to the upper end of the rod. The water in thus running down the rod will, it is claimed, absorb all the particles of dust, etc., that may be floating in the air, also cool and purify the vitiated atmosphere; and any of the known purifying chemical agents can be mixed with the water for the purpose of disinfecting, such as Condy's fluid. The water, after running down the rods, will be carried away by an arrangement of pipes under the flooring. To prevent any contact with the water, a guard of brass wire gauze can be fixed.

West Indian Phosphate.

The works at Mona Island, West Indies, which were started about two years ago, are now well advanced, and with a full productive capacity of from 20,000 to 30,000 tons a year.

The guano is already in high favor in the United States, where it has been thoroughly tested, and is pronounced one of the best, if not the very best, of such materials imported there.

The phosphate rock, of which now considerable is raised, is in active request in England and on the Continent, especially the latter, where the more highly concentrated fertilizers are generally used.

The deposits or accumulations occur on the floors of the immense caves penetrating the coast line of the island—a Tertiary coral rock—for ten or twelve miles almost uninterruptedly.

The thickness of the deposits is usually about four or five feet. The rock phosphate, which is really phosphatized coral rock, is found both as a massive stratum or shell underlying the bed guano, and also incrusting the masses of rock found embedded in the guano. The deposits are very interesting from a scientific point of view. The crystallized calcite, aragonite, and gypsite are found as pure as if from a primary formation.

Many new combinations of phosphoric acid, giving rise to new series of phosphatic minerals, are quite abundant. The two examined and described by Professor Sheppard, of New Haven, as monite and monitite are bi-basic and hold the highest combination of phosphoric acid known in any natural phosphate. They occur well crystallized. The Mona guano analyzes 52 to 68 per cent bone phosphate on a dry basis, and commercial samples of the rock 87 to 88 per cent bone phosphate. Both are singularly free from iron and alumina. Many Indian relics and remains have been found in and under the deposits, viz.: implements, pottery, shells, bones, etc. Some of these most interesting relics are in my possession. The work is under the personal supervision of Mr. J. G. Miller, of Ottawa, a practical scientist.—*Amer. Railroad Journal.*

AT Midland, Mich., the water works have been completed. The pumps have a capacity of 1,500,000 gallons daily.

Two Strange Playfellows.

The peculiar attachment animals of different species sometimes have for each other is quite remarkable; singular cases of this kind are being constantly recorded. The following from the Philadelphia *Press* is among the most singular we have read for some time:

Among the most interesting features of the Zoological Gardens, says the *Press*, are the peculiar relations existing between the capybara and two pretty kittens. The capybara (*Hydrochærus capybara*) is a curious creature. It is the largest of rodents, and in its habits and characteristics very much resembles our muskrat. It lives in the water and burrows in the banks of the South American rivers. It is about as large as a big dog, and is covered with coarse hair. As it lies in the pen in the deer house it is continually accompanied by the two kittens. In cold weather they snuggle close up to him, and keep as warm as toast by lying almost under their strange protector. Sometimes he will play with them and poke them about with his nose: thereupon they will mount his back and sit serenely, while he is unable to get them off. Then he will plunge into his water tank, and water hating tabby will spring off to escape the undesired bath. If the cats leave the pen, "Porgy" (he is so called after "Porgy" O'Brien, the circus man) will follow them to the bars and make a funny squeaking noise, beseeching his companions to come back to keep him company. Sometimes the keepers will bother the kittens. They fly at once to the protecting sides of "Porgy," while he will bare his long teeth and chatter fiercely. In the next cage is a wallaby, and while the cats go in and out, they do not attempt to be at all friendly. They confine their allegiance wholly to the more ugly capybara.

Purification of Smoke.

In a paper recently read before the Society of Civil and Mechanical Engineers by Mr. E. H. G. Brewster, the author describes the result of some experiments made for Sir F. Bramwell, with the object of finding whether it is possible to arrest the smoke from common coal fires by a process of straining and washing.

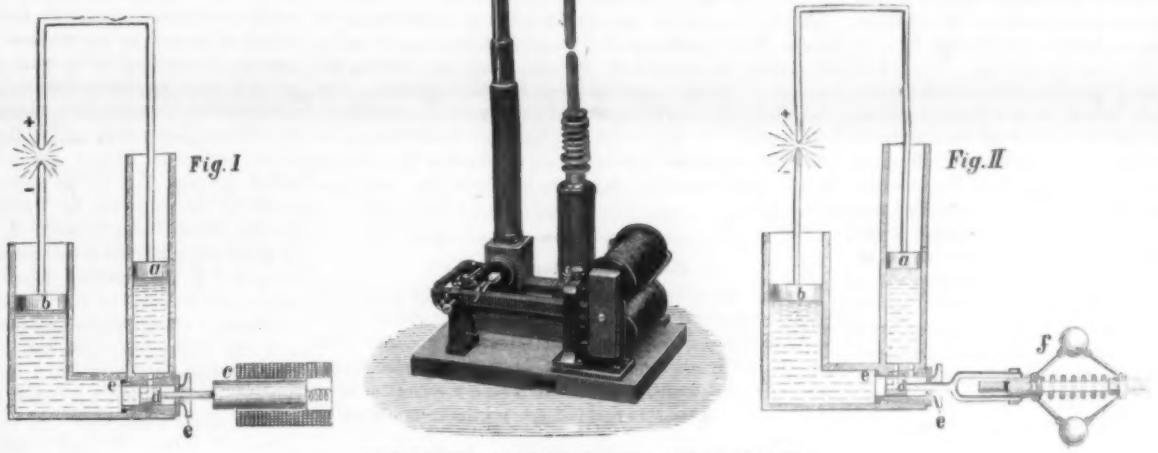
For this purpose a portable stove was so arranged that the products of combustion in the flue could either be allowed to pass off into the atmosphere in the usual manner, or be directed downward through another pipe into a wooden box filled with different scrubbing materials, drenched when required with a fine water spray.

At first the down draught pipe and scrubbing box were empty, and the color and density of the smoke were observed. The spray of water was then turned on, without the slightest apparent effect upon the smoke. The scrubber was then filled with broken coke to the depth of 1 foot 4½ inches, and the smoke passed through as before. No appreciable effect was produced, although the box was gradually filled with dry coke until it would not hold any more. The water spray was then turned on, and an improvement immediately took place, the color of the smoke turning from dirty black to yellowish brown. It was still smoke, however; and it was found that 10·3 cubic feet of coke in the wet scrubber, with a plentiful supply of water, would not clean the smoke produced by a quarter of an ounce of coal put upon a clear fire. Trays of matting, broken coke, cotton wool, and various other straining materials—wet and dry, hot and cold—were then tried in a scrubber 12 feet high and 3 feet square, but with the same result.

So long as the draught was not entirely choked, smoke came through in a more or less foul condition, but still smoke. The scrubbing was of the most perfect order, but the result of all the experiments was to show that when smoke is once made from bituminous coal nothing can be done to rid it of its more objectionable characteristics.

LAMP FOR LOCOMOTIVE HEADLIGHT.

The principal difficulty in the use of the ordinary arc lamp for the headlights of locomotives has been that the jarring of the engine while in motion affects the regulating mechanism, so that the light is rendered extremely unsteady or extinguished. This defect does not exist in the regulator shown in our engravings, the carbons being held in position by pistons acted on by hydraulic pressure.



ELECTRIC LOCOMOTIVE HEADLIGHT.

The pistons, *a b*, are of different diameters, the smaller one, *a*, being heaviest and connected with the positive carbon. The relative size of the two pistons is such that when the piston, *a*, falls of its own gravity, the piston, *b*, rises half the distance.

The regulation of the motion of the pistons is effected by enlarging or contracting the opening between the two cylinders. This is done by opening or closing a piston valve which is controlled by an electromagnetic helix in the circuit or by a centrifugal governor.

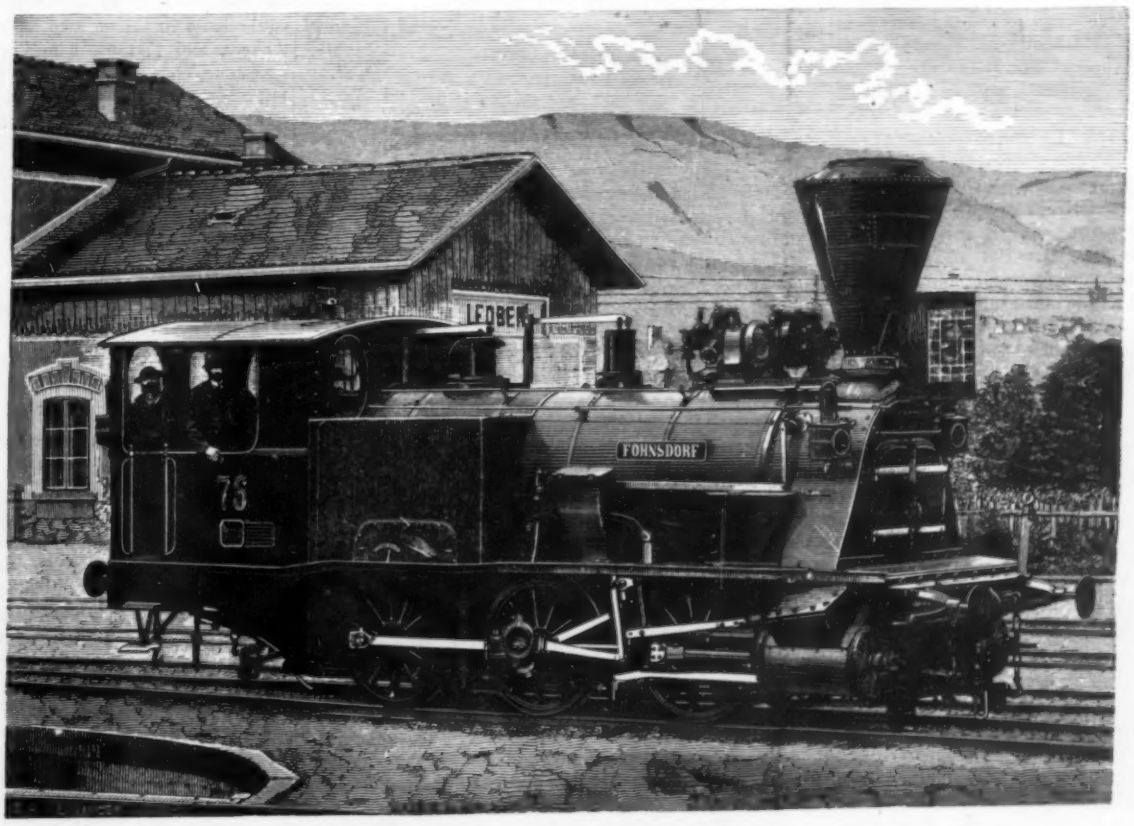
When the electromagnet is made weaker by the weakening of the current following burning away of the carbon, the piston, *a*, is moved back by the action of a spring, the communication is established again, and the carbons approach each other. By another position of the valve the fluid passes through a larger hole to allow a quicker movement of the pistons sometimes necessary, for instance when new carbons are to be put in.

Instead of using an electromagnet, the regulation of the arc can be secured also direct by the motion of the machine itself. For this purpose the shaft is connected with the piston, *a*, by means of a centrifugal governor, *f*, Fig. II. When the machine starts, the piston valve, *d*, is pulled out by the governor, and first closes the passage against the piston, *a*; in further pulling out the arc is established by drawing the liquid after it, and thus lowering piston, *b*. The burning away of the carbons increases the speed of the engine and machine, and a further pulling out of the piston valve takes place until a second opening allows the communication of the fluids as soon as the arc becomes too long. Then the carbons approach each other, the machine runs slower, the governor pushes the piston back and closes the opening again.

As the fluid between the two pistons cannot be compressed, and as no vacuum can be formed, the lamp burns well in spite of the heaviest shocks. We are informed many trial trips have been made on the Crown Prince Rudolf Railway, in Austria, with the greatest success. The lamp was fed by a dynamo machine of S. Schuckert, of Nuremberg, driven by a Brotherhood three cylinder engine.

The system was patented by Messrs. Sedlaczek & Wikulill.

Further information may be obtained by addressing Messrs. Paul Forchheimer & Company, 543 Broadway, New York.



ELECTRIC LOCOMOTIVE HEADLIGHT.

Lost City Retaken.

The Chilians have at present several thousand men advancing from different directions into the Araucanian territory. Up to now they have met with slight opposition, although past events have led the government to anticipate that stubborn opposition would be encountered. Among a number of letters from correspondents accompanying the different expeditions is one descriptive of the newly discovered site of the city of Villarica, a populous and opulent city, which, after a siege of two years and eleven months, fell into the hands of the Araucanians in 1692.

The writer states that he has walked among the ruins, now thickly studded with well grown oaks, and among them has traced streets which were fully one mile in length, and which been divided into blocks of 100 yards square, as was customary in most of the cities founded by the Spaniards. The city had been surrounded by a wall, which is yet in a fair state of preservation from three to six feet from the ground—a sufficient defense in former days against any ordinary Indian attack. Tiles were found which have hardened to the consistency of stone, and which are in better condition than when they were the mute witnesses of the destruction of this inland city so many years ago.

In the vicinity there is a very extensive lake, in which an island is situated which is reported to be swarming with the descendants of the domestic animals belonging to the Spaniards who were here sacrificed by the victorious Araucanians. The description given is brief in the extreme, but it will soon be supplemented by fuller and yet more interesting reports of this and other cities which were destroyed at the same time.

All the districts now being explored—and notably that surrounding Villarica—abound in mines, which returned large sums during the Spanish occupancy. These mines will again be worked under different auspices, and will lend their assistance in promoting the rapid settlement and development of Araucania, so long occupied by the scattered bands claiming dominion over it, but which now promises to become one of the richest provinces of Chili.—*Panama Star and Herald.*

A TRESTLE bridge across Lake Pontchartrain, on the New Orleans and Northeastern Railroad, will be twenty-one miles long.

THE BROAD STREET PASSENGER STATION OF THE PENNSYLVANIA RAILROAD COMPANY AT PHILADELPHIA.

We give several engravings of the New Broad Street Station at Philadelphia, also of the Filbert Street extension, structures recently completed and put into use by the Pennsylvania Railroad. (See first page.)

The Filbert Street extension, which furnishes the approaches to the station, is such a solid and broad structure that it is entirely relieved of the unsubstantial characteristics commonly associated with elevated railroads. When it is considered that the breadth is sufficient to afford ample accommodations to nine railway tracks, and that they rest upon foundations as firm as liberal expenditures and the best engineering skill can make them, it will be seen that all these approaches are invested with an appearance and reality of solidity which is not attached to elevated railways of the ordinary type. The passenger yard, which is bounded on the east by Sixteenth Street, is 2,042 feet in length by 106 feet in width.

Much of the space between Fifteenth and Sixteenth Streets between Market and Filbert, which on the lower story or first floor is used for freight purposes, is used as a passenger train house in the second story, under conditions that entirely relieve the passenger trains from obstructions caused by freight movements, and amid very beautiful and appropriate architectural surroundings. The portion of the second floor used as a passenger train house has a width of 172 feet, while the portion of the second floor of this structure which is near to Market Street, and has a width of 135 feet, is used for freight purposes. The passenger train house is provided with eight tracks and four platforms, one between each pair of tracks, twenty-four feet in width and elevated about fourteen inches above the rails. The building has an iron pointed arch roof of two spans, 85 feet each, and it is decorated with ornamental iron work.

In front of this structure the new station is located on a lot bounded by Broad, Filbert, Fifteenth, and Market Streets. This building has a front of 193 feet 5 inches on Broad Street extending southward from Filbert, by 122 feet 10 inches from Broad to Fifteenth. Its Fifteenth Street front is connected by a covered bridge of ornamental cast iron work with the passenger train house on the west side of Fifteenth Street, of which this bridge virtually forms a prolongation, the same roof being common to both. The style of the exterior on Broad is Gothic, treated freely to accommodate it to the requirements of a modern building. The first story is of granite, on the Broad and Filbert Street fronts. Above the first story the walls are faced with red pressed brick, with red terra cotta and moulded bricks freely used as adornments in a manner that has a novel and vary pleasing effect. On the angle of the two principal facades at Market and Filbert Streets a clock tower is carried up to a height, including the slated roof, of 176 feet. Its location is such that it can be seen to great advantage from distant points.

The station is admirably arranged for the purpose of furnishing accommodations for passengers in the first and second stories, and two additional higher stories are appropriately arranged for offices of the company. The first story contains ticket offices, baggage-rooms, stairways leading to the second story, and a waiting lobby to be used in connection with baggage-room and ticket offices. Another considerable portion of this story is open to the streets, front and rear, for the purpose of providing a convenient passage way for carriages and foot passengers from Broad to Fifteenth Street. The second story contains waiting rooms, a large dining room and restaurant, barber shop, lavatories, and other conveniences for passengers. It is approached by stairs and two hydraulic elevators, located on the north side of the waiting rooms. Communication with the trains is provided by a wide lobby extending the whole length of the Fifteenth Street front, on which the waiting room doors open on one side, and the gates to the train house on the other. The third story contains the kitchen and storerooms for the service of dining room and restaurant; with which they are connected by elevators and a private stairway. The other portion of this story is devoted to offices of the company, and the fourth story is occupied entirely by offices intended for similar uses. Access to both these upper stories is provided by a fireproof stairway and elevator, with entrance by a private door on Filbert Street.

The facing of interior walls of stair halls and lobby to ticket offices in lower story, and water closets in principal story, is of enameled brick, built up with the body of the walls and visibly bonded to it at intervals by heading courses of different colors, blue marble being used for caps, corbels, skirting, etc. The walls of driveway in lower story and of lobby to trains and exit stairway in main story are similarly faced with pressed brick in red and buff, and decorated with moulded brick. All the jambs and arches of interior openings to principal rooms of main story are built of blue marble, bonded with the brick work, with moulded labels and carved bosses, polished granite shafts with carved caps, and moulded bases of marble being used to carry arches over oriel windows in dining room and ladies' toilet room and at head of exit stair. The floors of exit stair hall and lobby to ticket office and the footways in lower story are laid with cement, in geometrical patterns of two colors, gray and red. The train lobby in principal story is similarly floored, the other rooms of this story being paved with marble tiles. The railings of entrance staircase and the gates to elevators are beautiful and original designs in wrought and cast iron.

The completeness of the work is shown in the evident care and study that has been bestowed on every detail, even the seats in the waiting rooms being well designed in harmony with the style of finish, and not the hackneyed "ready-made" affairs usually seen in such places. All this work is executed in hard wood, oak, cherry, and ash, showing their natural colors.

The tiling, brick, and marble work of the fine open fire places look well, and the mantels are in keeping with the rest of the wood finish.

A novel feature lately introduced by the Pennsylvania Railroad Company is the hansom cab service, which enables a passenger to go from the station to his destination at a very slight expense. These peculiar vehicles (shown in one of the views) are made by Messrs. Hincks & Johnson, of Bridgeport, Conn. We understand they are now being introduced in Washington and other cities.

The designs, details, and specifications were furnished by Messrs. Wilson Brothers & Co., civil engineers and architects, their Mr. Joseph M. Wilson being the well-known engineer of bridges and buildings to the company. The execution of the work has been effectively superintended by chief engineer W. H. Brown and his corps of assistants.

For our descriptive matter we are indebted to the *Railway World;* our engraving is from drawings by our own artist.

Genuine Violet Soap.

Genuine violet soap, which is generally sold in square lumps, marked "Finest perfumed old brown violet soap," enjoys the greatest approval of consumers on account of its agreeable odor. It is certainly made in every large manufactory of toilet soaps, but there are great discrepancies as regards the manner of its manufacture and the composition of the scent.

The writer has for many years used the following process for making a very fine violet soap in the cold way.

The process is as follows:

Finest cocoanut oil	48 pounds.
Fresh tallow	14 "
Best Lagos palm oil	1½ "

Melt together. To a portion of the fat while still hot add 2 pounds powdered and alcoholized orris root, and 2½ pounds powdered and alcoholized bergamot rind, equally distributed. The manipulation is best effected by sifting the perfumes into a large mortar, rubbing continually, and adding more fat until a homogeneous and moderately fluid mass has been formed, which is then added to the mass in the pan.

In the same manner 1½ pounds of liquid storax is dissolved in some pounds of the mixed fat with the aid of heat, and the liquid mass is carefully strained through a cloth into the pan.

The whole mixture of fat is then allowed to cool down to 90° F., and 31 pounds soda lye and 1 pound potash lye, at 66° Tw., are crutched in the usual manner.

Before putting in the forms the soap is further perfumed with—

Mitcham oil of lavender	250 grains.
Bergamot oil	135 "
Sassafras oil	75 "
Balsam of Peru	70 "
Ceylon oil of cinnamon	10 "
Musk	2 to 3 "

The musk is ground fine with a little milk sugar, moistened with the oils, and worked into the soap.

The soap when first cut has not a very fine color, and the smell is far from agreeable. In the course of fourteen days it takes a good brown color, and the odor improves with age.—*Chemical Review.*

Plate Glass Manufacture.

About thirty miles south of St. Louis, on the main line of the St. Louis, Iron Mountain & Southern Railway, is Crystal City, the home of plate glass manufacture in the far West. The works of the Crystal Plate Glass Company are located some distance from the station, but a small branch railway affords ready communication at all times. It is but a few years since it was the popular impression that plate glass could not be produced in this country, and that idea is but partially obliterated at the present time, while the facts are that much of the finest and largest plate glass now being used in the finest buildings of all our large cities is made in this country from native material, and is in every respect equal to that of foreign make. In the manufacture of glass of the very best quality the Crystal Plate Glass Company is equal to any other. The two things which account for this fact are, first, the superior material—in other words, the Plattin sand—which takes its name from the stream of that name on the banks of which the sand rock quarries lie; and secondly, the experience and skill of those under whose management the work is prosecuted. The deposit of sand is unquestionably the most extraordinary and valuable that has ever been discovered in the world. Incalculable in its extent, this white sand is here found in a lofty bluff into which tunnels have been driven for a distance of over fifty feet, and from which the invaluable material is obtained in absolute perfection ready for use. It is dazzlingly white and is perfectly translucent. The company owns 200 acres of this bluff, which averages seventy feet in thickness, and could not be exhausted in hundreds of years. The exceeding purity of the sand has excited the admiration of thousands. An analysis gives the following remarkable results: silica, 99·62; iron, 0·09; magnesia, 0·07. Other indispensable materials required in plate glass production are also found here in exhaustless quantity of the highest order of merit. It may be interesting to state that every ingredient that enters into any formula for the production of plate glass is obtainable in this country save soda ash, and that this can and will be made in St. Louis is but a question of time.

The immense works of the company were commenced in 1872 by the American Plate Glass Company, with a capital stock of $250,000. In 1874 this was raised to $500,000, and in 1880 to $1,000,000. The president of the company is E. A. Hitchcock, a position he has held from the formation. The manager is George F. Neale, a gentleman who has been connected with the manufacture of plate glass in Europe and this country ever since his boyhood. Under such experienced management all imperfections have been removed, and the company claims with just pride a production it is willing to submit to competition from any quarter. The process of manufacture of plate glass is very interesting, and it is only possible to fully appreciate it by witnessing the operation from the time the sand is taken from the quarries till the glass comes out of the polishing department in all its perfection. There are seven departments through which the glass goes in the course of manufacture, as follows: 1. The pot room, in which the crucibles and other fire clay articles are prepared. 2. The mixing department, in which materials are mixed preparatory to being melted in the pots. 3. The melting department, with a capacity for melting the contents of forty-eight pots daily, and a fourth gas furnace containing twenty pots is in course of construction. 4. The casting process, which might be called the supreme moment, as in the face of the most intense heat this side of Hades not a moment can be safely lost in the transfer of the great masses of fiery fluid from the pots to the casting tables. 5. The grinding department, where the glass is ground down to a dead level surface by being laid, embedded in plaster, on a disk grinder 21 feet in diameter. 6. The smoothing department, where the surface is smoothed by an interesting process after it is ground. 7. The polishing department, where, by the use of large felt covered rubbers, aided by a liquid rouge made from copperas prepared by the company, the glass is polished. These processes require a large amount of space. The grinding and polishing departments occupy buildings 742x120 feet and 660 x116 feet, besides which there are numerous other buildings aggregating many hundred feet in double line, containing (including the furnace and annealing halls) the pot house, in which the crucibles and other fire clay articles are prepared, the grinding and mixing houses, two boiler houses, pump house, blacksmith shop, and a number of other necessary buildings, all of the most substantial and enduring character.

The machinery and engines consist of three melting furnaces (all gas), 70 annealing kilns, 22 circular grinders, 50 smoothers, 36 polishers, and 20 steam engines, together with complete outfits in the very best kinds of machinists' tools and machinery for doing the company's own work, perfect equipments of their own blacksmiths, carpenters, brickmakers, and masons, a milling department for grinding limestone, clay, and plaster of Paris, and numerous minor but necessary buildings for the correct conduct of this mammoth enterprise. The city contains upward of 100 frame houses for the several hundred men, women, and children. The situation is a most charming one for residence as well as valuable for manufacturing purposes, and the buildings in all their strength, powerful machinery, the peaceful village with its refining influences, the raw material in its exceeding wealth and purity, and the manufactured article in all the pride of honest construction, combine to produce a marvelously beautiful picture upon the eyes and minds of all who may be so fortunate as to visit this romantically realistic city. The company has made special provisions for the comfort, health, instruction, and amusement of its operatives.—*New York Graphic.*

Value of the Sunflower.

Agriculturists claim it is the best egg producing food known for poultry, keeping them in a thriving condition and largely increasing the production of eggs. Every poultry raiser who tries it will find that this seed is the best food known for glossing the plumage of fowls, and is almost indispensable to those who want to fit their birds for exhibition to the best advantage. The Russian sunflower is easily raised, requires very little care, can be grown in fence corners, or other places difficult to cultivate. Its production of seed is immense, yielding often at the rate of one hundred bushels to the acre. It should be planted in hills four feet apart, any time from the 10th of May to the 1st of July. Three quarts of seed will plant an acre.

A Large Turtle.

Captain Augustus G. Hall and the crew of the schooner Annie L. Hall vouch for the following: On March 30, while on the Grand Bank, in latitude 40° 10', longitude 38°, they discovered an immense live trunk turtle, which was at first thought to be a vessel bottom up. The schooner passed within twenty-five feet of the monster, and those on board had ample opportunity to estimate its dimensions by a comparison with the length of the schooner. The turtle was at least 40 feet long, 30 feet wide, and 30 feet from the apex of the back to the bottom of the under shell. The flippers were 20 feet long. It was not deemed advisable to attempt its capture.

RECENT DECISIONS RELATING TO PATENTS.

Supreme Court, District of Columbia.

PUBLIC USE AND SALE.

An application for a patent cannot be rejected on the ground that the invention was in public use and on sale for more than two years before the time of filing the application, when the only proof before the Commissioner consists of mere *ex parte* affidavits taken without notice and cross examination.

The law confers upon the Commissioner authority to institute an inquiry into allegations of public use and sale of the invention, such as would bar the patent. This proceeding, on which the Commissioner acquires his information through the testimony of others, is a kind of judicial inquiry, and when the testimony is furnished by those in adverse interest, it becomes substantially a contest, and in such case justice requires that the fate of the application be determined by proof which conforms to the fundamental canons of the law of evidence, according to which *ex parte* affidavits taken without opportunity to cross examine are in no case admissible upon the merits of a cause.

Mystery of Minerals.*

It is painfully evident even to the most advanced scientists that, in the midst of the multitude of theories, and in the best light that the slowly accumulated wisdom of centuries has thrown upon the question, our real knowledge of the character and formation of minerals is very limited and uncertain. Wonderful progress has been made during the last half century in regard to some of the constituent elements of the most common metals and the method of fitting them for utility, but the great problem of their creation and union with other primary elements is still a hidden mystery. Metallurgists have discovered something of the effects of oxygen, and of hydrogen gas and its intimate and almost inseparable affinity with iron, but the real facts are hidden behind a veil that never has been penetrated.

Iron is generally understood to be a synonym for solidity and enduring permanence, yet science now proves that pure iron is nearly as unstable as water, and exists only as a curiosity in the laboratory. Some chemists claim that hydrogen is itself a metal, and it may be yet shown that many of the so-called pure metals, now supposed to be simple elements, are in reality compounds which science may be able to separate, perhaps almost into endless divisions. Alumina has recently come into notice, and a wide field, in view of its inexhaustible resources, opens up and stretches out beyond our grasp into the future. By its discovery our common clay is to be the mother of a mineral whose usefulness in the future *cannot now be* measured.

It may be found that the great oceans of air and water are the prolific mines from which the miners of the future will draw their supplies of mineral to satisfy the demand of their day and generation. It is already well proved that the atmosphere, the water of the ocean, the planets and comets, contain a perceptible quantity of mineral matter.

From a general harmony of the manifest workings of Nature, it would not be strange if it should be discovered that the vast variety of mineral substances now known, and the perhaps greater variety to be revealed, can be traced back to a common primal center, and it will be shown that the infinite varieties of form and character are but different manifestations, under special circumstances, of the same great force driven out into modified expression. Our increasing knowledge of the imponderable force, electricity, will throw much light into the hidden mysteries of the metallic world, and by its sun-like torch we may be enabled to follow with reverent steps, from the dim threshold of our present knowledge, the footprints of mineral creation to the cradle of its existence.

The Abundance of Gold.*

The future supply of gold, even for coinage purposes, is beginning to be one of more than common interest. Ancient history is resplendent with the prodigal display of gold by the barbaric peoples of the Orient. Arabia, Egypt, and Africa, according to this same authority, were prolific in their production of this precious metal. Pliny states that Cyrus returned from his conquest with thirty-four thousand pounds of gold (about $10,000,000). Alexander the Great brought $100,000,000 in gold from Persia.

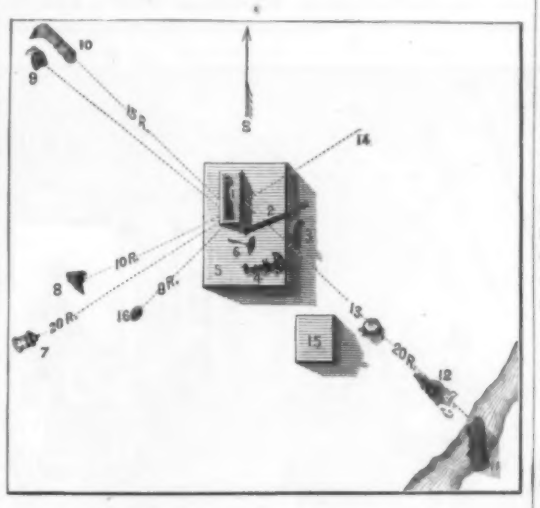
But at the present time these great fields, so renowned in history, are barren so far as the production of gold is concerned, and it is evident that Europe can be no longer depended upon to perform any appreciable part in furnishing a supply of gold to meet the demands of the future. Even in this country the statistics of production show a constant and marked decline in gold, although the field is largely extended and mining is more thoroughly prosecuted than ever before.

* *The Mining Review.*

Boiler Explosion in North East, Pa.

To the Editor of the Scientific American:

We have just returned from the scene of a boiler explosion. Last Saturday, at 9 A.M., the boiler in the steam sawmill of William Merkx, five miles south of this place, blew up with great force. The fireman had noticed water coming out around a rivet, and called the attention of the other men to it. They, five in number, stepped up to see what the trouble was; just as they had all got to the boiler, it parted at the union of the firebox and main part. The five men were all within six feet of the boiler, yet strange to say none were killed, and one was only slightly injured. All the rest were hurt some; one, a broken leg; one, a broken jaw; one, shoulder out; and the proprietor considerably injured; when found, the rim of the flywheel was lying across his body. The boiler was a portable locomotive firebox, with engine on boiler, Griffith & Weuge makers, and had been in use 18 years. It had about 50 two inch flues, 10 feet long. The mill was a total wreck; the carriage much broken up, the saw broken in many pieces. It is not known the amount of steam at the time of the explosion. The gauge showed 90 pounds, but it was out of repair and not reliable. The safety valve weight was set at 125, with another weight half as large with it. The safety valve was ground the day before, and might have been stuck; but they think steam was blowing off at the time.



1. Hole where boiler stood.—2. Stack.—3. Rim of flywheel.—4. Engine shaft and spokes of flywheel.—5. Mill.—6. Saw.—7. Engine cylinder.—8. Top and right side of shell of fire box.—9. Fire box. 10. Left side of shell of fire box.—11. Boiler.—12 and 13. Where the boiler struck.—13. A stump.—14. Position of fireman.—15. Shanty not injured.—16. Eccentric.

The engine (a 20 horse power) was running at the time, and the injector had just been started. The firebox shows the soot all burned off the inside of the top, which would indicate low water. The cut shows about the way things lay. The firebox was intact, but the covering or boiler sheet all around was gone. The firebox struck over just before stopping. The boiler twisted and was ended around. The cylinder and other pieces flew the whole distance without landing. Two or three men at a short distance saw the explosion, and describe it as terrific. The stack (about 20 feet high) rose straight up about 100 feet, and dropped straight down again.

The great mystery is how the men all got out alive. We send you pieces of the boiler iron, which we would call very poor.

A. I. LOOP.

The Great Apartment Houses of New York.

The mode in which the newest of the great apartment houses in New York are built and carried on is, says the *American Architect*, a peculiar one. While in other places such structures are erected at the cost either of some individual who rents his rooms to tenants, or of a small association of mutual acquaintances, who own the property in common, in the metropolis the whole business of securing land, raising subscriptions, and organizing the company for building is usually transacted by a single person, the promoter, as he is called, who, if he is successful in his efforts, finds compensation for his trouble either in transferring the land secured by him for the building to the association at a price somewhat higher than that which he has contracted to pay for it, or in some other way.

As the promoter needs a well-digested set of plans for the future structure, in order to interest the persons whom he wishes to have as subscribers, some architect is not unfrequently joined with him in the enterprise. Subscriptions are made for definite apartments, as shown on the plans, each subscriber agreeing to pay in cash about one-quarter as much as the same accommodation would cost in a separate house, the price of the apartments being decided beforehand by a careful allotment among them of the total cost of land and building, for which estimates have been already obtained. As soon as about two-thirds of the necessary amount is subscribed an assessment is called, and operations are begun, and at the same time certificates of stock in the association are issued to the subscribers, each one receiving an amount equal to the price of the apartment which he has agreed to take. The stockholders then elect trustees to take entire charge of the property, and each one receives from the trustees a perpetual lease of his apartment, containing the conditions as to the use of the rooms, or the behavior of their occupants, which the subscribers see fit to impose on themselves for their own protection. The subscriptions rarely represent the total value of the property, a certain portion being raised by morgage; but one or two floors of the building are generally reserved, to be rented by the trustees for the benefit of the association, and the income from this source pays the whole or a part of the mortgage interest. Other expenses, such as the cost of heating and service, are paid by the occupants, unless it should happen, as it sometimes may, that the rentals are sufficient to cover these also.

It need hardly be said that it is more economical to combine fifty or sixty houses under one roof than to build them in a row along an avenue, and the great apartment houses certainly offer many advantages to their owners in this respect. As it happens, however, such a mode of living is now fashionable, and the subscribers have generally been rich people who wish to decorate their new houses to suit their own fancy. To meet this taste it is usual to contract for the building rather cheaply finished, and without mantels, arranging with the subscribers that changes shall be made to suit them, at a fair price, and it is easy to understand that many persons, who have money to spare, spend enough on such fittings to make the cost of their apartment considerably larger than the subscription. On the whole, however, this works to the profit of the more careful stockholders, whose dwellings gain a reflected distinction from their brilliant neighbors, and if nothing more serious is to be said against the new system, its popularity will be very little affected. On the other hand, the advantages which the best apartment houses offer are very important. Situated as they are upon Fifth and Madison Avenues, and on the Park, they furnish to the householder of modest fortune, but good social connection, a beautiful and comfortable home in the midst of all that is brightest and most attractive in New York, at a cost no greater than that of a shabby dwelling of the same capacity, but inferior in light, air, and sunshine, in the dirty streets beyond the fashionable quarter, and in that city, where the line between lavish opulence and prudent economy is somewhat unpleasantly drawn, the value of good location is not likely to be underestimated.

Cable Car Traction in Philadelphia.

The new cable motor of the Union Passenger Railway Company, on Columbia Avenue, Philadelphia, between Thirty-third Street and East Park, was opened on the 5th of April. The cable, which is of crucible steel, and 9,200 feet in length, was run at the rate of seven miles per hour, by the two "Porter & Allen" engines of 100 horse power each, which have been built to supply the motion. The cable passes through a tunnel or pipe beneath the track, and becomes attached to the car by the action of a "gripe," which moves along a narrow, continuous opening midway between the rails. Three trains of three cars each were run several times over the road, a distance of about 1¾ miles, and the workings of the system were thoroughly tested to the satisfaction of the visitors. The cars started gradually and smoothly, and were stopped promptly, but not so suddenly as to be unpleasant to the riders. The same speed was maintained on the heavy grade of three feet to the 100 as on the level portion of the road.

Cochineal Color for Elixirs.

The difficulty of preparing a cochineal color that will keep has suggested the use of glycerine as a preservative. Prof. C. L. Diehl's formula, as given in *New Remedies*, is as follows:

Cochineal	1 ounce.
Carbonate of potash	½ "
Powdered alum	½ "
Cream of tartar	1 "
Water	8 "
Glycerine	8 "

Reduce the cochineal to a fine powder, add the carbonate of potash, and triturate it with two ounces of water. Allow the mixture to stand one hour, add the alum and cream of tartar successively, and, when effervescence has ceased, the remaining water, filter, and add the glycerine.

Testing a Lightning Conductor.

The spire of the General Assembly Hall, Edinburgh, has just been fitted up with a new lightning conductor. Some doubt having been expressed, says the *Electrical Review*, as to the efficiency of the old conductor, it was resolved to subject it to a strict test, and for this purpose a copper wire was carried up one side of the spire and attached to the conductor on the other side. When the connection was effected, the electrical resistance is said to have reached the "very alarming amount of 800 ohms." The conductor was jointed together by screw couplings, and this extraordinary resistance is explained to have been due to the "defective character of many of those couplings."

AN insect exhibition is to be held in Paris this year from July 1 for just three weeks, under the auspices of the Central Society of Agriculture and Insectology. It will include (1) useful insects; (2) their products, raw, and in the first transformations; (3) apparatus and instruments used in the preparation of these products; (4) injurious insects and the various processes for destroying them; (5) everything relating to insectology.

"MOORE COUNTY GRIT."

The peculiar formation of this stone, and its remarkable adaptability to grinding corn meal, has, in a comparatively short time, been thoroughly brought to the attention of the milling world. In Moore County, North Carolina, located about in the center of the State, this conglomerate was discovered by the early settlers, and was known to exist in a well-defined vein for a distance of nearly two miles, and was first worked in several places by them for their own use in grinding corn meal, and was sought for in every section of the State, and hauled in wagons long distances. In many cases where it came into competition with other stones used for grinding corn meal, its superiority was so marked that parties paid large sums of money to secure the "Moore County Grit," to enable them to hold their trade.

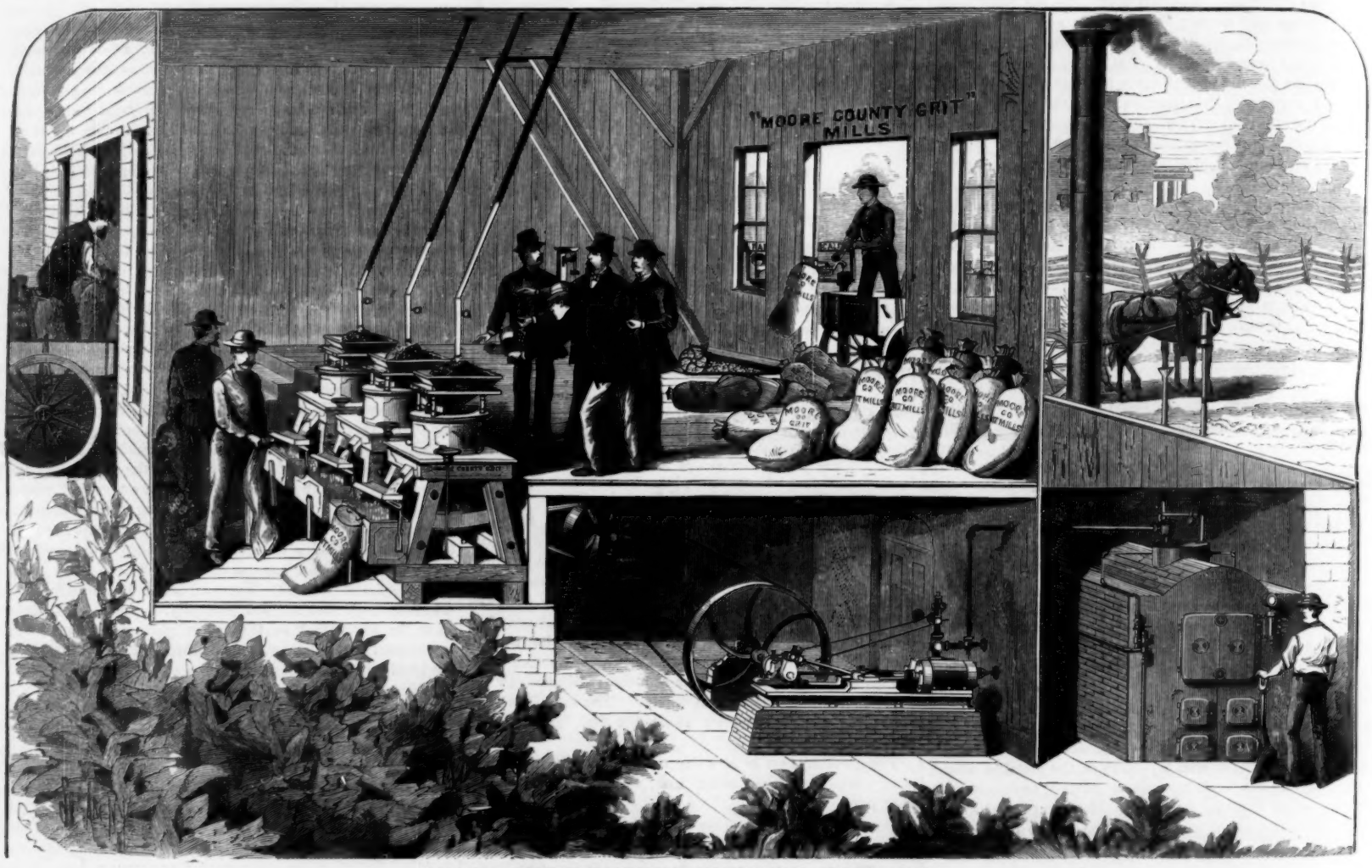
About four years ago the entire vein was purchased by the North Carolina Millstone Company, and for the first time since its discovery, improved machinery and appliances were put to work in quarrying and developing this grit. Starting in a small way, the company has gradually built up a large business and developed a little village around their works, solely upon the merits of this stone. Its claims of superiority over other millstones for grinding corn meal are: that it will not glaze, and will grind large quantities of corn without dressing; that it wears differently from other millstones, its tendency being to wear sharp and not smoothly on its face. It grinds meal into round particles, and will raise a bushel of corn when ground into meal 30 to 40 per cent, insuring light, superior table meal, which is not liable to be heavy when made into bread. In many sections of the country this particular feature is of the greatest importance, especially so in the Southern and Southwestern States, where corn bread is the staple article of food. It is claimed that, owing to the peculiar nature of this stone, and its natural sharpness, it does not require as much power as other millstones to grind a given number of bushels of corn, and in point of durability it has shown great superiority over other millstones.

Our illustration is a sectional view of a mill built by the North Carolina Millstone Company, and provided with 3 runs of their upper runner 36 inch portable corn mills, with silent feed, exhaust fan, sifter or bolter, and meal box. The capacity of this 3-run mill, when grinding fine table meal of superior quality, is 25 bushels per hour, or if used on chop or mixed grain, 50 bushels per hour. The engine running these mills is a 25 horse power cut-off engine with boiler. It is claimed that these mills, grinding at the above rate, are run with six feet of wood for ten hours, which is very little fuel for the amount of work performed.

The claim for these mills is not for the large amount of corn that can be forced through them, but for the quality of the meal. It is also claimed that if the quantity is increased to over eight bushels for a 36 inch mill and five bushels for a 30 inch mill, the same high character of meal cannot be produced by any stone of the same diameter.

We are informed that a railroad has been chartered recently, to extend from Fayetteville to High Point, N. C., and the prospects are that within the next eighteen months it will reach Parkewood, the little village that owes its existence to this grit. At present this village is sixteen miles from any point of railroad communication, and the new road will give it a very considerable impetus, and will enable the company to deliver their products with a diminished outlay.

For further particulars in regard to the "Moore County Grit" mills and millstones, address North Carolina Millstone Company, Carthage, N. C.



"MOORE COUNTY GRIT" PORTABLE CORN MILLS.

American Timber.*

When the facts are taken into consideration that a reckless denudation of American forests has been steadily carried on for a great number of years, and that, with advanced civilization, increased population and enormous influx of foreign immigrants have surpassed the prophecies of even the most sanguine among latter day prophets, it is not surprising that this question of timber supply should be of such deep interest to our practical as well as political economists.

As an evidence of the reckless and wasteful system of destruction adopted by the earlier settlers of this country, portions of Pennsylvania known as the Allegheny district were covered with magnificent pine forests, but as there was no immediate demand for the lumber, thousands of acres of those valuable timber lands were downed by the axmen to make way for the farmer. What was the result? Fields of unproductive, stony lands, comparatively worthless, were procured at a sacrifice of inestimable millions which the timber would be worth to-day.

The same story might be told of the eastern Atlantic slope of the Allegheny range. Williamsport, Pa., one of the busiest sawmill towns of that region, is now idle for the want of material, while Haven being the only point along the Lehigh River where the industry pays, with logs becoming scarcer and dearer each year, its fate will be sealed ere long.

Thirty years ago one-half of the white pine supply was furnished by the State of New York, but at the present rate of cutting the timber, it will have disappeared in another decade. The forests of the Northwest were then drawn upon, though much of this considered inexhaustible supply is fast fading away in the face of the woodsmen and their manufacturing allies. Michigan is almost entirely denuded, the standing timber being estimated at not more than a four or five years' supply. Indiana, once famous for its walnut, has little or none of this valuable timber left, and manufacturers in the East who relied upon her for their supplies are now forced into the use of mahogany. The armies of forest destroyers have now been turned toward Canada; the supply of timber is enormous, as they were in fact in the other named sections, but past experience shows that a few years will be sufficient to cause the same story to be repeated.

With such truths as the above to reflect upon, the question of the timber supply of the world naturally becomes a momentous one, and one deserving mature deliberation and judicious legislation. Thousands of trees are annually cut to be used for purposes that might be dispensed with, notably fences, telegraph poles, and fuel. These can, in most instances, be dispensed with or substitutes employed that would make a great diminution in forest cutting. Barbed wire or no fences at all, telegraph wires laid under ground, and when possible coal, are modes of economy to be adopted for each, and ones which are practicable in almost every region of the country. As in Europe, preventives to decay must be employed on crossties, and brick, stone, or iron utilized for building purposes where wood is now used.

In addition to these immediate acts of economy of timber, tree planting should be encouraged and carried on, not as an experiment, but a business; and by placing in each State some competent botanist to superintend the replanting and cultivation of new forests, assisted by a corps of trusty, industrious guards to protect them, much of the barren and worthless lands of the continent can be made to produce crops of valuable timber.

To the uneducated in the lumber trade no idea can be formed of the vast amounts of timber that are annually cut on this continent, hence many are inclined to oppose economy in the treatment of forests, and are difficult to convince as to the rapid manner in which they are destroyed; though, when the subject is investigated and statistics examined, it will be seen that a few years of active operations will denude any portion of the most densely timbered lands. Such figures as 24,000,000 feet in one place, 50,000,000 in another, and 1,500,000,000 in another, and they representing the cut in the neighborhood of one stream, form but a fractional part of the cut all over the country. The value of timbered lands should be greater at present than ever before, and no matter how far they are removed from transportation, they are too valuable to be wantonly destroyed. Just as soon as the most eligible are utilized, necessity will force transportation facilities toward the others, and as a consequence render them valuable. It is very questionable if any lands in the South, upon which there is a full growth of pine, poplar, hickory, elm, gum, or cypress, could be made to produce by clearing them what the standing timber will be worth in the same given number of years. Therefore, let the Southern land owners take warning, and not only economize their timber, but hold on to the land for a few years at least.

*The *Southern Lumberman* is constantly warning its readers against the destruction of the timber lands in the Southern and Middle States, and persistently counsels owners of such lands to withhold the ax from their forests, unless the trees are full grown and ripe for the harvest.

THE Edison installation at the House of Commons lately started running. The lights are distributed throughout the dining-room and library. Sixteen electroliers, each containing a group of sixteen lamps, are in use, the current being supplied by two 250-light "K" dynamos. The lamps can, if necessary, be fed by one of these machines should any accident incapacitate either of them. The dynamos are driven by an Armington & Sims engine. A cable, 150 feet long, runs from the engine room to the lamps.

HORATIO LYON MEMORIAL LIBRARY, MONSON, MASS.

The walls are of two shades of Monson granite outside, with brick backing, laid hollow, and the building is nearly fireproof in its construction, the floors being of iron and brick, and roof framing of iron. The cost was about $25,000, the money being given by Mrs. Caroline R. Dale, daughter of Mr. Lyon, and an endowment of $20,000 was given by Mrs. Lyon. W. N. Flynt & Co., owners of the Monson Granite Quarries, were the builders; Mr. Stephen C Earle, Boston, Mass., was the architect. Our engraving is from the *American Architect.*

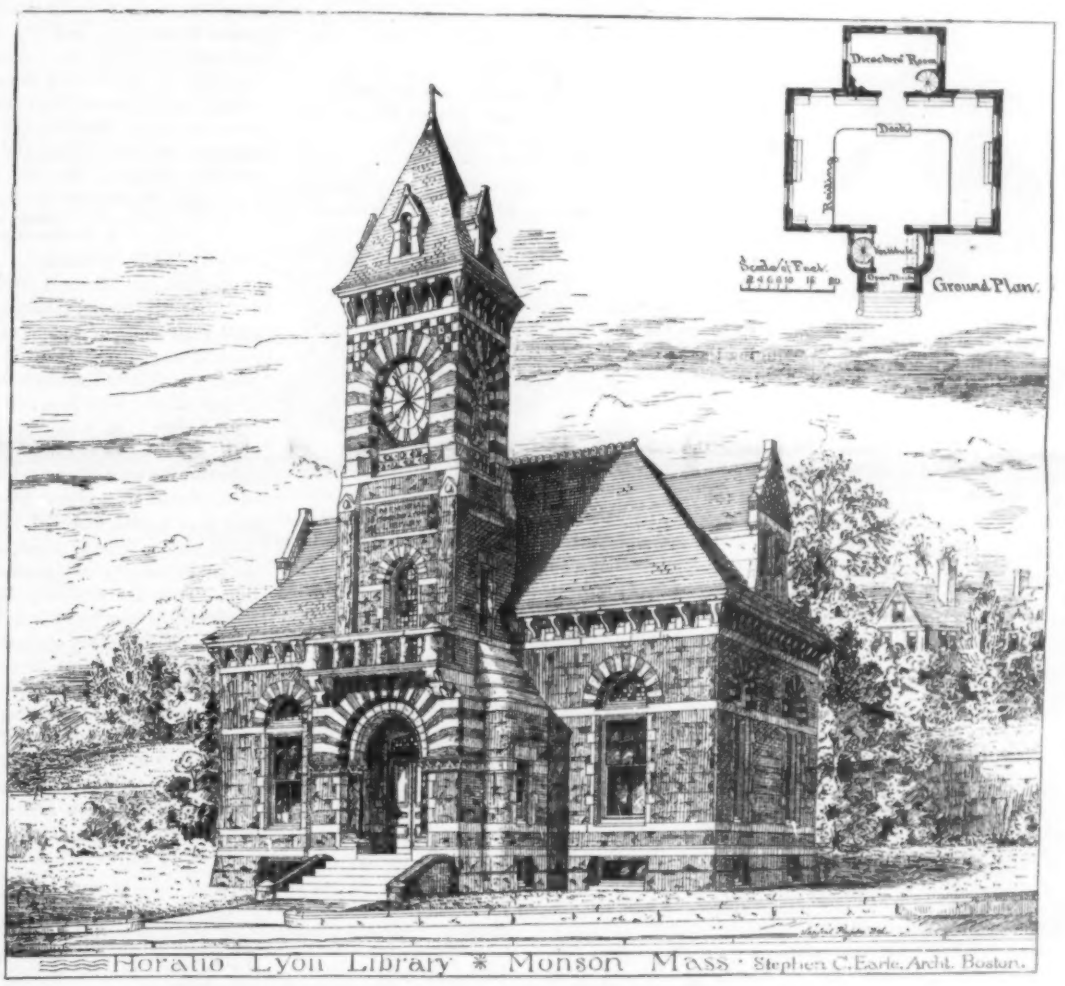
Lawns: Their Formation and Management.*

It is an old but a very true saying, that a smooth, closely-shaved lawn is the simplest and the loveliest element we can use in the adornment of our grounds. We may procure the choicest flowering plants as well as the most rare ornamental trees and shrubs that our nurserymen and florists can obtain, but unless we have a good lawn all our efforts will be in vain; for depend upon it, a good lawn is as necessary to complete the adornment of our grounds as a good carpet is to complete the furnishing of our rooms. We may take our rooms and furnish them with the rarest works of art and the most expensive furniture we can obtain, but if we leave the rough pine floor uncovered or unstained, they have anything but an attractive and finished appearance. There appears to be something wanting to render them complete and enjoyable. As it is with our rooms, so it is with our grounds. If they contain the most costly plants and the choicest ornamental trees and shrubs we can obtain, while the lawn is neglected and uncared for, what attraction have they for us? Why, none; the simple fact being that the one thing necessary to render the whole complete and enjoyable is wanting.

If the lawn, then, is so necessary in the adornment of our grounds, it should be properly attended to and cared for. I say *properly*, for a good lawn is well worth all the time and care an intelligent person can bestow upon it; and it is my opinion that more lawns are ruined from ignorance and neglect alone than *from any other* cause. If it is our intention to prepare good new lawns, it is absolutely necessary that the work be thoroughly and properly done, for a good lawn will last for many years if the ground has been properly prepared, the proper grass or grasses selected and sowed, and last, but not least, the whole properly attended to and cared for.

In forming a new lawn, the work should not be too hastily and imperfectly done, as this will prove to be a serious mistake, and one that cannot be rectified afterward. In the first place, we must see that our grounds have the desired grade, and that they are thoroughly and properly drained and in the condition necessary to produce a good crop of vegetables; if so, they will produce good lawns. The preparation of the ground is best done in the fall, so that it can become well settled by the time we are ready to sow the seed in the spring. Prepare the ground by giving a heavy dressing of well decomposed stable manure, and work it in well by plowing thoroughly. A sub-soil plow should follow the common plow. Then harrow thoroughly, and finish by leveling the whole as neatly as possible. As soon as the weather becomes settled in the spring, apply to each acre from five to six hundred pounds of bone dust; harrow it in thoroughly, and be careful to have a good surface soil of from eight to ten inches in depth throughout the entire ground, and finish by having the surface as finely pulverized as possible, removing all sticks, stones, etc.

The ground being properly prepared, the next consideration is the sowing of the seed. This should be done as early in the spring as possible, choosing a calm day. The sowing should be carefully done in order to distribute the seed equally over the entire surface, and not in spots, as this looks bad, and is not creditable to the sower. Sow thickly at the rate of from four to five bushels to the acre, and rake the seeds slightly in. Give, if possible, a sprinkling of soot or woodashes, in order to render the seed distasteful to birds, and finish by rolling thoroughly.



What varieties of grass to sow in order to obtain a satisfactory result is really a serious question. I have no hesitation in saying: Sow June or blue grass, *Poa pratensis*, only; no mixture, no white clover, nothing but pure, clean June grass. In advocating the sowing of June grass, pure and simple, I am aware that I am treading on dangerous ground, for I know that many of you will differ with me. I admit that the June grass will not form a lawn quite as soon as the various mixtures known as lawn grass, but a lawn of the June grass, when obtained, will be found to be well worth waiting for. June grass will thrive in almost any soil and situation, with full exposure to the sun or in partial shades, and in seasons of drought, when everything is suffering from want of moisture, the June grass will retain its verdure to the last. However, some will insist upon having a mixture; and it is said a very good one can be made by adding two pounds of sweet vernal grass, *Anthoxanthum odoratum*, and one pound of white clover, *Trifolium repens*, to four bushels of June grass. This is a mixture highly prized by some, but I cannot see of what benefit the clover is, for it is my opinion that it would destroy the young grass, and eventually die out itself. About the middle of June our lawn will be looking pretty green; but among the young grass a great many weeds will be noticed, and the temptation to remove them will be very strong; but do not do it, for, depend upon it, any attempt at their removal at this time will do more hurt than good. About the first of July our lawn will be ready to be mowed; but we must not cut too low, and the clippings should be permitted to remain in order to protect the young and tender roots. After mowing, roll thoroughly; and after this mow weekly, if necessary, until the grass ceases growth. In the autumn the annual weeds will have disappeared, and the perennials can be cut out with a stout knife.

If often happens that it is very inconvenient to prepare new lawns, and in such cases we must try to restore the old. In order to do this properly we must commence in the autumn. First, fill up all inequalities by carefully lifting the sod, filling in, and replacing it; at the same time remove all perennial weeds, and then give a good dressing of stable manure. As soon as the weather becomes settled in the spring, the manure should be removed, then rake thoroughly, using a good iron rake, and be particular to remove all dead grass, moss, etc. When this is done, give a good dressing of bone dust, and sow grass seed as for a new lawn. Roll thoroughly, and, as soon as the grass is long enough, mow; mow weekly throughout the season, excepting in seasons of severe drought. It seems almost superfluous to remark that mowing should always be done with a lawn mower in preference to the scythe. The work is thus more quickly accomplished, to say nothing of its neater and more attractive appearance when finished.

After the lawn has become established, it should be properly cared for; every spring it should be carefully examined, and all perennial weeds removed, a good dressing of bone dust or ashes given, and the whole thoroughly raked and rolled. Mowing should also be attended to from the time the grass commences to grow in the spring until growth ceases in the autumn. Once a week is none too often to mow, the clippings being permitted to remain in order to protect the tender roots; a rake should never be used on the lawn after it is cleaned in the spring. If it becomes necessary to use a rake to remove the clippings, on account of their unsightly appearance, it is absolutely certain that the mowing was not done at the proper time. In mowing, avoid cutting too close, for, depend upon it, close mowings and a frequent use of the rake will soon destroy the finest lawn. Close mowing encourages the growth of very many troublesome, noxious little weeds, as well as that great pest of lawns, crab grass—*Panicum sanguinale*. It should be remembered, however, that no lawn can be maintained in good condition unless it is frequently and thoroughly rolled. Moles are sometimes very annoying; the only remedy for these pests consists in the proper use of a good trap. A few words as regards sodding: at the best it is slow and expensive work, and, unless for places of very small extent, I would not advise the use of sods. In forming new lawns it is sometimes absolutely necessary to lay sod along the margins of walks, and also on steep banks, as heavy rains might wash away the soil before the seed has had time to vegetate; any clear sod can be used for this purpose, care being taken to firm it well with the back of the spade.

In seasons of severe drought some resort to watering; but unless one has an abundant supply of water and the necessary facilities for doing the work thoroughly, it is better not to make the attempt, for anything short of a thorough watering will do more hurt than good. I think that if the ground is properly prepared, the mowing properly attended to, and the clippings permitted to remain, in order to protect the young and tender roots, little or no injury from drought need be apprehended. I am often asked, What is the best manure for lawns? I do not think that there is anything better than good stable manure applied just after the ground becomes frozen in the fall, and removed as soon as the weather becomes settled in the spring. Some, however, decidedly object to stable manure, on account of its untidy appearance, and so bone dust can be substituted. Its effect, however, will not be noticed so soon. In forming new and restoring old lawns, an abundant supply of good stable manure is indispensable. Guano and commercial fertilizers are much esteemed by some, and more or less is said in their favor; but, as far as my experience has extended, I have found them to be very variable in their results. In wet seasons they are very satisfactory; but in seasons of drought the result is quite the reverse.

Again, some object to the use of stable manure for the reason that it contains the seeds of many noxious weeds, and in this way they would introduce them into their lawns. Now, I would not apprehend any danger from this source, if the lawn has been properly attended to, and seeds sowed the very instant vacancies are noticed; and I have often noticed that wherever any vacancies exist they soon become filled with weeds, no matter what fertilizers have been applied; and it is a most essential point in the management of lawns to encourage the growth of the good grass as much as possible, and thus prevent noxious weeds from taking possession.

The arrangement and proper disposition of ornamental trees and shrubs on the lawn is also very important, and deserves the highest considerations. In this paper it is impossible to treat of this as fully as its importance demands, for local circumstances and personal requirements would render almost worthless any suggestions that I might offer. My only object in alluding to the subject here is the desire to caution all against planting trees and shrubs too thickly, and thus destroy the very object we have in view when planting them. A room crowded full of furniture has not a very inviting or attractive appearance; neither has a lawn when thickly covered with trees and shrubs. Grass will not grow in such situations, and in consequence the whole will not present a very attractive appearance. A few well grown handsome specimens, properly arranged and cared for, with a smoothly mowed lawn, will give more satisfaction and pleasure to all who see it, as well as to the favored proprietor.

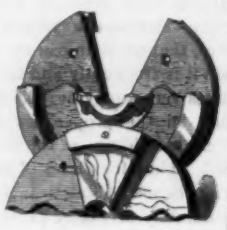
*An essay prepared for the New York Horticultural Society, April meeting, 1883, by Charles E. Parnell.

COAL tar sugar is the latest discovery Its chief advantage over other sugar is its superior sweetness.

RECENT INVENTIONS.

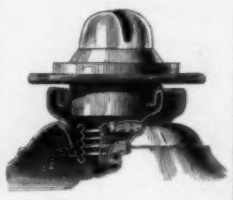
Split Pulley.

This split pulley is formed mainly of wood, and is made in separate sections or halves to provide for putting it on or taking it off the shaft laterally. This pulley is divided into sections in a serpentine or irregular course. Thus constructed, the pulley sections will come together with a perfect fit after each separation of them, and will not wear and work loose when united. The serpentine cut by which the pulley is divided into separate sections is not arbitrary and may be greatly varied. The invention provides for other divisions of the pulley, whereby the serpentine cut does not extend through the whole thickness of the pulley, but is diverted, breaking the joint between the pulley sections. This invention has been patented by Mr. Gustavus B. Sanborn, of Bristol, N. H.



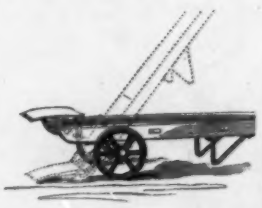
Improvement in Oil Lamps.

This invention consists of an attachment to oil lamps, and particularly to the tubular lantern, to prevent the escape of the oil from the lamp, which in the case of this kind of lantern gets into the turret and the tubes on top, making bad smells, and is dangerous; and another difficulty with such lanterns and other lamps is the flickering of the flame, due to the insufficient supply of air to the oil reservoir as the oil burns away, which this invention is calculated to prevent. In the device shown in the engraving, an oil catcher and the lamp collar are formed in one piece, with the part the burner screws in soldered in it. This forms an annular space into which the oil is received from the burner, and through which the air enters the body of the lamp to replace the oil burned. The collar is returned upon itself and leaves an annular space of about $\frac{1}{32}$ inch, to permit the oil to follow down and return to the lamp through the circular row of holes in the oil catcher. By means of this device the oil is prevented from creeping over the outside of the burner or lamp, and the lamp is rendered safe, as the air is not heated before entering the lamp, as is usual in lamps of the ordinary form. This useful invention has been patented by Mr. Samuel Maxim, of Wayne, Kennebec County, Me.



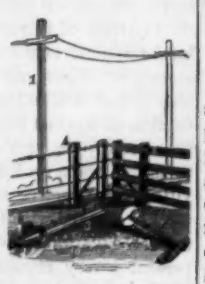
Improved Hand Truck.

The engraving shows a hand truck which has a broad bearing surface at the lower or front end, so that the articles to be transported by it will not be injured by the nose at the front or lower end of the truck. A plate is pivoted at or near its middle to the upper edge of the nose of the truck, by means of a pintle passed through holes in the end standards of the nose, and through eyes on the under side of the plate or platform, so that the plate or platform can swing on the upper edge of the guard. A rod passes through a series of eyes in the under surface of the plate at the inner edge, and is provided at the ends with longitudinally slotted arms, through which thumb screws pass into screw threaded apertures in the inner surfaces of the side pieces of the truck. The plate can be inclined more or less to the truck, and can be locked in the desired position by means of the thumb screws. This invention has been patented by Mr. Alexander Sloan, of Pittson, Pa.



Improved Fence Post and Telegraph Pole.

The engraving shows an improvement in fence posts and telegraph poles, recently patented by Mr. Frank Brown, of Chagrin Falls, O. The post is made of plate iron bent so as to form three flanges, the middle flange being double and arranged at right angles with the two others, which lie in the same plane, and are punched for receiving nails or screws for holding boards. When the post is used for a wire fence, the central double rib is notched to receive the wire, which is held in place by a plug. The lower end of the post is notched to receive an anchor plate having a triangular hole, through which the post is slipped. The plate is afterward turned and locked in the notches. The same post, without the holes or notches, is used for a telegraph pole. Fig. 1 shows the device applied to telegraph poles; Fig. 2 shows the auger for setting the posts; Fig. 3 is a post with anchor plate attached; Fig. 4 shows the post with fence wires; and Fig. 5 shows the posts with boards attached. This post is light, strong, durable, and readily manufactured.



Improved Corset.

An improved corset for curing curvature and weakness of the spine is shown in the annexed engraving. To each side of the corset a crutch made of hard rubber, or of steel covered with cloth, is secured at the upper edge of the corset, by means of a flap, which is passed over the bow of the crutch, and is then passed down on each side of the springs and secured to the corset. The crutch is composed of a steel or hard rubber bow, to the ends of which is attached one end of a pad formed of a tubular fabric stuffed with some soft material. A hip pad is attached to the inner surface of the corset at the hip at each side. Steel springs, which are secured to the crutches, project downward and overlap steel springs secured to and projecting upward from the hip pads. The steel springs are provided with guide loops for holding them together and guiding them. The steel springs may be locked in the desired position in relation to each other by the thumb screw. The crutches are adjusted, and the corset is worn until the spine has become strengthened, and then the crutches are gradually lowered by shortening the springs by adjusting the thumb screw, the fabric of the corset be folded more or less, according as the springs are shortened more or less. We are informed that this device is recommended by physicians as a valuable appliance for the purpose for which it is designed. Further particulars may be obtained by addressing the inventor, Mrs. Villa Hayward, Box 710, Augusta, Me.

Improved Tray.

An improved tray on which articles can be carried very conveniently without danger of their sliding off, and without requiring the use of both hands while carrying the tray, is shown in the engraving. An oval or circular tray is provided with wings, to which handles or bails are hinged, and the latter are curved in such a manner that when they are folded down they rest on the rim of the tray. The hinges of the bails or handles are provided with stops to prevent swinging them upward or outward too far beyond the vertical position. While carrying the tray, the highest points of the handles or bails are to be swung in contact, so that the tray can be carried and held by one hand, leaving the other free to open doors, etc. The rim prevents the dishes and other articles on the tray from sliding off in case the tray is accidentally inclined. The tray can be used in dining-rooms, sick-rooms, etc. When the handles or bails are swung down, they cross each other. The rim of the tray is about one inch high. In place of making the tray oval, it can be made circular; but the oval shape is considered preferable. This invention has been patented by Sara L. Vreeland, of Hackensack, N. J.

A Dark Blue Marking Ink.

Christian Knab, in Munchberg, Bavaria, makes a blue preparation good for marking trunks and boxes, because it readily combines with wood, cloth, etc., and resists the action of the weather. His process is given in the *Deutsche Industrie Zeitung* as follows: 100 pounds of a 30 per cent fluid extract of logwood are put in a suitable kettle, with 3 quarts of alcohol, to which 2 pounds of hydrochloric acid has already been added.

The mixture is kept at 68° Fahr., and well stirred until thoroughly mixed. Next he dissolves 10 pounds of (yellow) chromate of potassium in 30 pounds of boiling water, and adds to it 20 pounds of hydrochloric acid, stirring well, and when it has cooled to 86° Fahr., stirs it very slowly into the mixture already in the kettle. The whole is then warmed to about 185° Fahr. The mass, which then becomes an extract, is stirred a short time longer, and to it is added 30 pounds of dextrine mixed with 20 pounds of fine white earth (terra alba), and well stirred through. The mass, when taken from the kettle, is put into a mill where it is thoroughly worked together. It is, lastly, put into tin boxes and left standing a long time to dry out.

The Oldest Tree in the World.

The oldest tree in the world, so far as any one knows, is, says *Knowledge*, the Bo tree, of the sacred city of Amarapoora, in Burmah. It was planted 288 B.C., and is therefore now 2,170 years old. Sir James Emerson Tennent gives reasons for believing that the tree is really of this wonderful age, and refers to historic documents in which it is mentioned at different dates, as 182 A.D., 223 A.D., and so on to the present day. "To it," says Sir James, "kings have even dedicated their dominions, in testimony of a belief that it is a branch of the identical fig tree under which Buddha reclined at Urumelaya when he underwent his apotheosis." Its leaves are carried away as streamers by pilgrims, but it is too sacred to touch with a knife, and therefore they are only gathered when they fall. The King oak in Windsor Forest, England, is 1,000 years old.

Curiosities of the Dead-Letter Office.

One of the rooms of the Post-Office Department building, Washington, has recently been transformed into a museum for the exhibition of curiosities that have accumulated in the Dead-Letter Office. The articles exhibited number several thousands, and embrace everything imaginable, from a postage stamp of the Confederate States to snakes and horned toads. A correspondent of the *Evening Post* has been rummaging around in this department, and he finds that among the relics is a record of all the valuable letters received during the early days of the postal service in the colonies of North America. This record is in the handwriting of Benjamin Franklin, and shows that during a period of eleven years only 365 letters containing valuables were sent to the Dead-Letter Office. The records of the Department to-day exhibit at a glance the enormous difference between the postal service of the present and of the early days of the country's history.

The number of letters received at the Dead-Letter Office during the last year was 4,207,496, or more than 13,600 each working day. Of this vast number, nearly 20,000 contained money to the aggregate value of upward of $44,000; 25,000 contained checks, drafts, money orders, and other papers to the total value of about $2,000,000; while 52,000 had inclosures of postage stamps. This vast amount of mail matter was sent to the Dead-Letter Office because three-fourths of the addresses could not be found; one-eighth were addressed to guests in hotels who had departed without leaving addresses; nearly 300,000 were insufficiently prepaid, and as many more were either erroneously or improperly addressed. Eleven thousand bore no superscription whatever.

Wherever practicable, letters are forwarded to the parties addressed, if they can be reached in any manner. If they contain valuables, and the sender is known, they are returned; otherwise the valuables are sold and the proceeds deposited in the United States Treasury. If letter-writers would exercise an ordinary amount of care, the majority of the work of the Dead-Letter Division would be dispensed with, and all the trouble and annoyance of losses by mail would be avoided. But the business of this branch of the Post-Office Department increases from year to year.

A Prehistoric Cemetery.

Two miles from Mandan, on the bluffs near the junction of the Hart and Missouri Rivers, says the local newspaper, the *Pioneer*, is an old cemetery of fully 100 acres in extent filled with bones of a giant race. This vast city of the dead lies just east of the Fort Lincoln road. The ground has the appearance of having been filled with trenches piled full of dead bodies, both man and beast, and covered with several feet of earth. In many places mounds from 8 to 10 feet high, and some of them 100 feet or more in length, have been thrown up and are filled with bones, broken pottery, vases of various bright colored flint, and agates. The pottery is of a dark material, beautifully decorated, delicate in finish, and as light as wood, showing the work of a people skilled in the arts and possessed of a high state of civilization. This has evidently been a grand battlefield, where thousands of men and horses have fallen. Nothing like a systematic or intelligent exploration has been made, as only little holes two or three feet in depth have been dug in some of the mounds, but many parts of the anatomy of man and beast, and beautiful specimens of broken pottery and other curiosities, have been found in these feeble efforts at excavation. Five miles above Mandan, on the opposite side of the Missouri, is another vast cemetery, as yet unexplored. We asked an aged Indian what his people knew of these ancient graveyards. He answered: "Me know nothing about them. They were here before the red man."

Incombustible Paper.

Mr. G. Meyer, at a recent meeting of the Societe d'Encouragement, exhibited a new paste combination designed for the manufacture of incombustible cardboard or paper or all sorts and shades. The inventor did not wish to make known at the time the chemical composition of this paste, and also of a new ink exhibited with it, as the patents that he had applied for in Germany and America had not yet been obtained. He made known the fact, nevertheless, that asbestos was the principal thing employed in the manufacture of his incombustible paper.

He presented specimens of writing, printing, engraving, etc., made with his inks of different colors, and also showed a water-color drawing that had been submitted to the fiery ordeal of the potter's furnace. The painting had preserved all its brilliancy and the paper all its flexibility. By request, the inventor for a few minutes exposed to a gas flame a sheet of his paper upon which he had written with ink of his composition. Neither the ink nor the paper was changed. In order to demonstrate by a most conclusive test how great a heat the paper and ink were capable of withstanding, Mr. Meyer then placed a lithograph, 15 by 16 centimeters, between two layers of glass in a state of fusion. On removal the paper was found to have completely resisted the action of the heat, and the engraving to have preserved all its sharpness.

Removal of Freckles.

The careful application of a small piece of the ointment of the oleate of copper at night upon retiring will usually remove the freckles. The oleate copper ointment should be prepared by dissolving one drachm of the salt of oleate of copper in sufficient oleo-palmitic acid to make a soft ointment.—*Shoemaker.*

ENGINEERING INVENTIONS.

Mr. Edward S. Plimpton, of Denison, Ia., has patented an improved mechanism for converting the reciprocating motion of windmill pitman rods into continuous and steady rotary motion, thus avoiding the dead center trouble so often experienced in operating windmills.

A device for facilitating the handling of freight is the subject of a patent by Mr. Francis H. Weeks, of New York city. The invention consists of a narrow gauge endless railroad, and endless propelling chain built in the freight platform, and of a system of sidings and small trucks and automatic switches, whereby any of the trucks may be switched automatically from the main track to any desired siding. The trucks are moved along the track by the endless chain and caused to automatically stop at one point in the circuit of the endless track to receive the load.

A combined railroad tie and chair is the subject of an invention for which Messrs. William H. Gibbs and George W. Snook, of Hopewell, N. J., have obtained letters patent. The invention consists in a tie provided with a top flange with inclined cross flanges having angular grooves, and a lug to receive the chair. The chair is made with a central offset to receive a block to support the rail, and downwardly-inclined side parts to interlock with the grooved cross flanges of the tie, with slots formed in its side parts to receive the spikes and locking screws, and lugs to prevent the locking nuts from turning.

An improved steam actuated valve, the object of which is to prevent the main valve from striking at the end of its stroke, and to regulate the speed of its operation, so that the pump valves shall seat themselves without jar, has been patented by Messrs. L. S. Allison, H. John, and T. E. Evans, of Hazleton, Pa. Through a stuffing box in the head of the main cylinder extends a slide rod, the inner end of which projects into the cylinder a sufficient distance to be struck by the piston when the latter reaches near the end of its stroke, so that the outer end of the rod will strike the lower end of a lever, thus actuating the valve stem over the secondary steam chest.

A very simple but effective apparatus for bending rails and bars has been patented by Mr. Ladislav Vojacek, of Sinichov-Prague, Bohemia. The apparatus consists of three rollers so mounted on a frame that, when applied to the object to be bent, the two end rollers will bear against one side of the bar, while the intermediate roller will bear against the opposite side of the bar. A screw regulates an adjustable bearing of the middle roller, which when it is turned decreases the distance between the planes of the middle roller and the two end rollers, and thus bends the article to the desired degree. Provision is made for causing the rolling apparatus to travel along the rail, and also to prevent it from becoming distorted during the operation.

An improved high and low pressure steam engine for use in locomotives and for other purposes where it is necessary to obtain power quickly, and where great variation of power is needed, as in the case of trains of different lengths, has been patented by Messrs. Henry and William Monk, of Quebec, Canada. The cylinders and steam chest of this engine are so combined as to leave very little space for radiation, and unnecessary expansion of steam, and to reduce valve friction to a minimum while the connecting rods are so arranged as to couple both pistons to one crank, to avoid dead center. The valves and ports are further so constructed as to operate high pressure steam in the low pressure cylinder, so that the engine may be made to start up with full power, as is impossible with the present high and low pressure engine.

A car starter which is designed to store up the force which is required to stop a car in order to use it in setting the car in motion, has been patented by Mr. Theodor Soetbeer, of New York city. The car is mounted upon square axles which are provided with pinions of suitable size. The pinions gear with a longitudinal rack, which is connected with the braking mechanism in such a way that when the brake is set, the rack will gear with the upper side of the smaller pinion wheel. This pinion is attached to the axle, thus forcing the rack backward and depressing a spring connected with the end of the rack. When the brake is released for setting the car in motion, the spring will also be liberated, thus forcing the rack forward, and this engaging with the under side of the larger pinion wheel sets the car in motion.

An improved railroad switch, which may be operated automatically or by hand, has been patented by Mr. Simson Nichols, of Lisbon, Me. The rails of the main line and the side line are stationary, but the switch rails are movable and rest in chairs. A long triangular frame is provided, the shorter side of which is connected with the switch rails, while the end or angle subtending this is fastened to a sleeper between the right rail of the side line and the corresponding left rail of the main line, and this frame is pivoted in the middle, so that the acute angle or the short side will be always raised from the ground or sleeper. A flange is attached to this frame, at the end between the pivot and the acute angle, in such a way that if a train passes down either track and the switch is not set, the wheel of the locomotive will pass over this flange and depress it, whereupon the other end of the frame will be raised, elevating thereby the rails of the switch, which will then be moved laterally by the action of the wheel upon the side bar of the frame, which is higher than the track. As soon as the frame has been moved beyond the point of contact with the wheel, the wheel passes off the flange mentioned, when the switch rails will fall in place in the chairs provided for them. The switch may also be set by hand.

MECHANICAL INVENTIONS.

Mr. John B. Beale, of Rush Center, Kan., has recently patented a method of cutting and preparing broomcorn, whereby it is claimed that considerable labor is saved in the harvesting and handling.

Mr. James Preston, of New York city, is the patentee of an improved pump frame, the invention consisting in a very simple device for attaching a pump cylinder upon its support, so that by simply detaching one bar the pump may be turned on its axis, so that the spout will project in any desired direction.

A novel shoe tying machine has been patented by Messrs. A. W. Weeks, of Worcester, and L. St. Clair, of Lynn, Mass. This machine is designed for tying shoes together in manufacturing establishments, so that the two shoes of one pair will be held together, and not become separated in handling.

An improvement on tipping trucks for transporting and discharging dirt, ores, etc., has been patented by Mr. Henry Grafton, of London, England. The truck is made to discharge its contents either at the side or end as may be desired. Arrangement is made for tipping the car at greater or less degree as desired, and holding it in place after tilting.

An improved trap for sewer pipes, etc., has been patented by Mr. Herman Pietsch, of Flatbush, N. Y. The invention consists of a box provided with an inlet pipe having an elbow at its lower end, and a gate having hinged to it a double jointed hinged plate, whereby all foul gases will be prevented from passing beyond the trap up the pipe.

An improved washing machine has been patented by Mr. J. O. Hardwick, of Colorado City, Colo. The tub is upright in form, and is provided with a pair of washboards which face each other in the tub. The clothes to be washed are forced up and down between the two rubbing boards, and are thereby thoroughly cleansed.

A new device for supplying steam to the cylinders of steam engines, designed especially for operating the log standards of a saw mill carriage, has been patented by Mr. Evan T. Davies, of Manistee, Mich. The cylinder of the engine has a rack piston rod which acts directly upon a pinion wheel, from which the power is transferred to two miter wheels, which operate the saw mill carriage.

An improvement in ice cream freezers has just been patented by Mr. Ferdinand Espel, of San Francisco, Cal., which consists of a horizontal revolving outer vessel containing a cream can and beater, the latter of which is so geared that it may be revolved in either direction reversely to the direction the cream can is turned, to more readily agitate and congeal the contents.

An improved method of unloading hay and grain in barns and depositing the material at any place in the loft is the subject of a patent granted to Messrs. Wray Mitchell and Oscar C. Mitchell, of Rapids, N. Y. The process consists in elevating the rack on which the hay is brought from the field to the barn, by means of a windlass, when the rack is slid over tracks to the place desired, and discharged of its contents.

A device for holding tools during the grinding process has been patented by Mr. W. T. Lander, of Williamston, S. C. The tool is firmly held against the stone by a clamping mechanism, which is mounted upon the bench in such a way that the tool may be shifted toward and from the stone and secured in any position as desired. By this device the tool is permitted to traverse the face of the stone, and the edges of the tool will be ground more accurately than if held by hand.

Mr. John Gartner, of Dallas, Texas, has patented an improvement in propelling vessels by supplementing the ordinary screw propeller with others located in depressions on either side of the ship. The inventor connects propellers on the opposite sides of a vessel with one another and with a stern propeller, so that they will all act at the same time upon different parts of the vessel in propelling her forward, and thus it is claimed that an increase of speed is attained with less consumption of power.

Mr. John Vanston, of Durango, Colo., is the patentee of an improved sawing machine which consists substantially in mounting the saw or saws upon a frame so constructed that the frame may be moved laterally on the shaft, whereby the logs may be sawed into boards without the necessity of changing its position on the carriage at every cut of the saw. The saw is hung above the log, which admits the use of saws of smaller diameter and of thinner gauge, which avoids a great waste of timber.

A combined die plate and tap wrench for cutting the threads of male and female screws has been patented by Messrs. H. M. Vincent and W. N. Smith, of New Bedford, Mass. This device consists in a die plate made with slots in its sides to receive sliding guards. The guards engage with end grooves in the dies, which, as they are moved forward and backward by the screw handle, engage with and release the dies by means of stationary pins attached to the die plate. An angular recess is formed in a portion of the die for receiving and holding a tap without removing the die.

A compact folding chair, adapted for transporting and storage, has been patented by Mr. W. J. Decker, of New York city. The invention consists in attaching to the sides of the seat frames at the rear corners thereof metal slides of such a size and form as to fit and slip up the bars which support the back of the chair. Metal blocks are attached to the inner side of the bars to limit the downward movement of the slides, and support the seat when in use. The chair may be readily folded and unfolded for use, and a number may be packed into small space for shipment.

A very ingenious sewing machine, so devised as to make a double stitch and sew directly from two spools of thread, has been patented by Mr. Carl von Rein, of Rudolstadt, Germany. The invention consists in a rotary spool holder, moving in a circular track and operated by driving arms, and also in a movable frame surrounding a cam on the driving shaft. This frame is connected by a slotted lever with a lever carrying the feeder teeth, and operates the lever which carries the feeder teeth. Provision is made for adjusting the length of the stitch.

An improvement in fire escapes of the telescoping kind, several tubes sliding within each other, is the subject of a patent granted to Mr. Napoleon B. Terry, of Pensacola, Fla. The ladder is supported upon a truck, and the upper end of the uppermost tube is provided with a car or box by which persons may be rescued from the upper windows of a burning building or by which means firemen may ascend and take up hose or other appliances for subduing the fire. The apparatus is operated by steam or compressed air, from a boiler on the truck.

A station indicator to enable passengers on steam or horse railroads to see for themselves the street or station they have reached, has been patented by Mr. Ben McCrary, of Hot Springs, Ark. A board is provided within the car, upon which is inscribed the name of the streets or stations on the line. A gong sounds to call the passenger's attention to the fact that a station is being approached, while a pointer directs the traveler's eye to the name of the place on the board, which is about to be reached. The mechanism may be operated by the conductor or automatically from the gearing of the car.

An improvement in feathering paddle wheels has recently been patented by Mr. Joseph Lane, of Danville, Ill. The wheel has arms fitting in the hubs as usual, and provided with two concentric rims. The paddles are mounted on oscillating arms, and a locking device consisting of a crossbar is hung upon the end of arms that extend from the hubs, and these are connected in such a manner that they lock the oscillatory arms before the paddles enter the water and while in the water, until they reach the draught point, when the arms are liberated, and the paddles assume the proper angle for leaving the water edgewise. During their upward movement, the locks are drawn outward, leaving the paddles to fall on either side by gravity until they commence to move downward, when the locks are again projected.

AGRICULTURAL INVENTIONS.

A simply constructed implement for cotton stalk cutting has been patented by Mr. J. M. Stone, of Howe, Texas. The blade of the cutter is attached to the draught bar in such a manner that it will lie nearly flat on the ground, for severing the stalk with a hand shear cut.

Mr. E. T. Gregg, of Marshall, Mich., is the patentee of an improved cultivator, designed for use in garden farming to remove weeds and pulverize the surface of the ground already sown with seeds. This hand cultivator is mounted like a wheel barrow, and is provided with a pulverizer furnished with a number of short teeth and having a blade to cut off the weeds from the surface of the ground.

Improvements in the construction of harrows and harrow teeth have been patented by Mr. Kittil Aunsen, of Winchester, Wis. This invention consists in employing flat bars for the harrow teeth, and twisting them below where the bars connect with the beams, half the teeth being twisted to the right and half to the left, so that the harrow will not be crowded sidewise. Teeth so arranged make wide furrows, and at the same time draw much easier than when thicker teeth are employed.

MISCELLANEOUS INVENTIONS.

Messrs. Frank K. Herr, and Samuel K. Herr, of Westminster, Md., have patented an improvement in the bodies of vehicles which is so constructed that the body swings lower than the main part of the elliptical springs on which the body rests.

Mr. Frank P. Monfort, of Oskaloosa, Ia., is the patentee of an improved lock for securing the seat of vehicles. The contrivance is automatic in its operation, and when the seat is made fast, the lock holds the seat firmly in place.

Mr. Charles P. Jackson, of Chicago, Ill., is the patentee of an improvement in ice boxes, by which he claims that the ice will be longer preserved than in other refrigerators. The arrangement of this box is very convenient, and the receptacle for the ice may be readily removed for filling or cleaning.

A simple and inexpensive method of manufacturing cutlery has been patented by Mr. Hadar Hallstrom, of Eskilstuna, Sweden. The process consists in forming hollow metallic handles on knives or forks by compressing the handle sections into a concave form, and then welding together the corresponding edges.

Mr. Albert Hall, of Cypress Hill, N. Y., has recently patented a very good improvement in the manner of fastening buttons to garments. By the attachment of the shank to the button after the former has been forced through the material, a permanent fastening is assured.

A convenient case for holding toilet implements has been patented by Messrs. J. O. Jasmagy of Brooklyn, N. Y., and D. H. Frost, of New York city. This case is so constructed as to hold firmly in place either an oblong or an oval mirror, as the case may require.

A rabbet plane has been invented by Mr. Oliver Hegglund, of Oakland, Neb., for which he has obtained a patent. The hub of the plane is furnished with a recessed block, to which the handle is pivoted in such a manner that it may operate the plane at different angles for various kinds of work.

Mr. J. W. Hill, of Jersey Shore, Pa., has patented a novel method of attaching the tugs of a harness to the hame connections, so that the draught will be brought to bear, not upon the points of the tugs where the rivets pass through it and through the tangs, but upon the whole width of the tug.

A miner's candlestick is the subject of a patent granted to Mr. J. C. Martin, of Tuscarora, Nev. This consists in a candlestick, a knife blade, a prong, and one or two other implements of use to miners, combined in one article in a very compact form to be carried in the pocket.

Messrs. A. B. Baughart and C. H. Treat, of Frankford, Del., have patented an improved method of making inlaid frames, the object of which is to produce inlaid frames constructed in such a manner that the edges of the veneers forming the frames will be exposed to view upon all four edges of the frames.

Mr. Jacob Hesch, of Titusville, Pa., has patented an improved apparatus for boiling acids and chemicals, which relates to benches of glass retorts for use in restoring spent acids or any chemicals that are boiled in glass retorts. The object of the invention is to obtain a more economical application of heat, especially when the full bench of retorts is not in use.

A convenient bill file for the use of merchants and others has been patented by Mr. P. J. Wicks, of Saltersville, N. J. The hook is divided, and one portion is provided with a spring which prevents the bills from getting disengaged from the hook without a pressure against the spring, when the bill required may be withdrawn without disturbing the other bills.

A novel bridle bit for fractious horses has been patented by Mr. M. J. O'Leary, of Springville, Cal. This bit is made in two parts held together by springs, to operate as one bit when the horse is in a gentle mood, but which separates and operates as a double bit to open the mouth and gag the horse in case he becomes unruly.

A composition for preventing the fouling of ships' bottoms and for the preserving of wood, iron, etc., from deterioration has been patented by Mr. N. B. Dennys, of Singapore, Straits Settlements. This compound consists of a mixture of sulphide of copper, oxide of zinc, and Chinese varnish, which forms a limpid mass which may be applied with a brush.

Mr. Davit F. Hull, of Hagerstown, Md., has patented an axle for vehicles, and which is also adapted to agricultural machines of various kinds. A spindle is secured to the axle in such a manner that when the former becomes worn, it can be withdrawn and turned around to bring a new part of the spindle on to the wearing part of the axle box, thus prolonging its usefulness.

A novel device, which serves the double purpose of grasping and cutting cords for grain binders, has been patented by Mr. Alfred Savage, of Salem, Ore. This simple device consists of a spring actuated slide for cutting the cord, and of a jaw which slides in a groove and has a hook at its outer end for grasping the cord and holding it firmly after it has been cut, so that the end thereof may not be lost.

A very simple and inexpensive transplanter for tobacco and other plants has been patented by Mr. S. S. Neblett, of Whittle's Mills, Va. This consists in attaching a cone-shaped pin for making a suitable hole in the ground, to the side of a curved crosspiece, one end of which is beveled for scraping the earth about the root of the plant after it has been inserted in the hole formed by the pin.

Mr. Willard E. Barcus, of Vineland, N. J., has patented an improved molasses measure, the object of which is to obviate the difficulties of measuring molasses consequent upon its sluggishness, and to obviate the difficulty of properly clearing the measure of its entire contents when emptied. The measure is provided with a discharging follower, controlled by a spring and an internal scraper, by means of which this is accomplished.

Messrs. G. T. Woodlief and G. R. Dunn, of Calvert, Tex., have received letters patent for a boot and shoe indicator intended for the use of retail dealers to facilitate keeping stock with accuracy. There is an indicating plate which is attached to the boxes, shelves, and drawers, showing what goods they contain. This indicator is not limited in use to the boot and shoe trade, but may be used for keeping stock in any mercantile business.

An improved guard for carving forks has been patented by Mr. T. C. Curley, of Brooklyn, N. Y. The guard, which may be of any desired form, is pivoted in a slot in the handle of the fork, and is secured in the position desired by a locking device, consisting in a piece of steel slotted lengthwise to form two springs, which slot is provided with a suitable enlargement at one end for holding the guard firmly when it is set for carving.

A circular switch for galvanic batteries, intended especially for remedial purposes, is the subject of an invention of which Mr. Henry Lowe, of Brooklyn, N. Y., is the patentee. A circular switch is surrounded by a circle of insulated plates, and is connected with one of these plates by an adjustable plug and with another by conducting wires and a switch arm, the object being to connect the plates with the cells of a battery by conducting wires, so that any number of cells may be included in the circuit.

A novel method of constructing and fitting together stove pipe sections is the subject of a patent granted to Mr. John Vincent, Jr., of St. James, Mich. The improvement consists in making the pipe sections with longitudinal grooves, and so formed as to lap one over the other. Saddle-like clamps are fitted over the overlapping portions of each stove pipe length. By Mr. Vincent's invention the diameter of the pipe may be varied as desired. The ends of the pipe sections are provided with screw threads, by which they are screwed one within another, making a fast joint.

A hen's nest, so devised that hens may lay their eggs, incubate, and hatch their young without being disturbed by other fowls, has been patented by Mr. J. Q. Sook, of Olivet, Kan. The coop is provided with a door hinged at the bottom to swing up and down. Inside the coop and between the door and the nest a treadle board is arranged on pivots, and connected with the door in such a way that the weight of the hen on the treadle will swing the door open when the hen leaves the coop, and will close it after her when she enters the box again.

Mr. Boswald Berry, of Gosforth, Newcastle-on-Tyne, England, has obtained a patent for an accordion based upon the principle that any musical scale is so related to another whose keynote is three full tones distant from the keynote of the former that the first six natural notes of the former scale are identical with the five accidentals of the latter, together with the seventh natural note of the latter scale. The instrument has two sets of keys, one set being connected with reeds which give the first six natural tones of the diatonic scale in each octave, and the other set connected with reeds which give the accidentals and the seventh natural note of the scale in each octave, the relative position of the keys of the two sets being the same throughout the key board.

Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

NEW BOOKS AND PUBLICATIONS.

THE PLASTERER'S MANUAL. By K. Cameron. New York: William T. Comstock, 1883.

This little pocket manual contains accurate descriptions of the tools and materials used in plastering; description of the appearance and action of the various limes and cements; instructions for making mortar, and for doing all kinds of plastering; cistern building; form of contract; useful tables and recipes; and important cautions, suggestions, etc. The work is copiously illustrated, and the intention of the author to give as much practical information as possible in the least space is well carried out.

THE FORESTS OF ENGLAND, AND THE MANAGEMENT OF THEM IN BYGONE TIMES. By John Croumbie Brown, LL.D. Edinburgh: Oliver & Boyd, 1883.

This little volume is published as a small contribution to the literature of Britain on subjects pertaining to forestry, and very interestingly treats of the mode in which forests and woodlands were managed in England previous to the present century. There is a great deal of very interesting historical matter in this book, well calculated to attract the attention of other classes of readers than those who make the study of forest science a specialty.

THIRD BIENNIAL REPORT OF THE STATE BOARD OF AGRICULTURE FOR THE YEARS 1881–82. Topeka, Kansas: Kansas Publishing House, 1883.

The report of the Kansas State Board of Agriculture, submitted to the public in this volume, is the outgrowth of a policy adopted shortly after the organization of the board, that is, that of presenting in as succinct and as attractive a form as possible the resources and capabilities of Kansas. The history of the phenomenal growth and development of Kansas during the past decade is well known to the reading public, and the State Board of Agriculture, which issues these valuable reports, can safely claim a large share in its accomplishment.

THE HISTORY OF MEXICO. By Hubert Howe Bancroft. Vol. I. San Francisco: A. L. Bancroft & Co., 1883.

This work forms the ninth volume of the author's writings on Mexican history, the first of the five great periods of which have already been exhaustively treated in the fifth volume of his *Native Races*. The story of the conquest of Mexico, which is begun in the present volume, and which will extend through another, has already been treated in a masterly manner by many writers, but none of these, perhaps was so well provided as Mr. Bancroft with the necessary resources for undertaking such a work, and none has been able to free himself from race, religious, or political prejudices, and to treat the subject, like our author, in a perfectly impartial manner. The conquest of Mexico, opening to the world as it did the richest, most populous, and most civilized country on the northern continent, forms one of the grandest episodes in early American annals, and a well written history of it, such as we have in the volume before us, forms, on that account, peculiarly attractive reading.

BOOKS FOR THE YOUNG; A GUIDE FOR PARENTS AND CHILDREN. Compiled by C. M. Hewins. New York: F. Leypoldt.

This little book is designed to guide children in the choice of books for a course of reading, and contains a list of all the most suitable works in the departments of science, literature, and art for such a purpose. The idea is a most excellent one, and seems to have been well carried out by the author, who tells us that she has had practical experience, not only in trying to guide the reading of children, but in actually reading with them.

THE ASSAYER'S MANUAL; AN ABRIDGED TREATISE ON THE DOCIMASTIC EXAMINATION OF ORES, AND FURNACE AND OTHER ARTIFICIAL PRODUCTS. By Bruno Kerl. Translated by W. T. Brannt; edited by William H. Wahl, Ph.D. Philadelphia: Henry Carey Baird & Co., 1883.

The object of this manual is to give directions for executing docimastic tests of natural and artificial products by methods taken mostly from practice, and which are of interest not only to metallurgists, but also to other technologists. Although presented in very condensed form, every method of importance will be found to have received notice in this volume, and its practical value estimated at its proper worth. The utility of the translation has been increased by the introduction of the English equivalents of the French metric weights and measures, wherever these occur throughout the work.

RICHARD WAGNER AND HIS POETICAL WORK FROM "RIENZI" TO "PARSIFAL." By Judith Gautier. Boston: A. Williams & Co.

"This book," says the author, "is, in reality, only addressed to the small number of the initiated, who, having broken through the occult precinct of the new art, have the incomparable joy of admiring without reserve all that is worthy of admiration." Readers who are musically inclined will find in these pages detailed analyses of poems which have not been translated into English, and these analyses will allow those who do not understand German to follow the representations of the great master' works.

LIBRARIES AND SCHOOLS. Papers selected by Samuel S. Green. New York: F. Leypoldt, 1883.

This little volume is well calculated to interest book buyers, readers, and teachers. It consists of a selection of papers on a topic which is becoming a prominent question in education. The book contains papers by Charles Francis Adams, Jr., and the compiler on the relation of the public library to the public schools, and by R. C. Metcalf and W. E. Foster on the results of experiments made in different places by teachers, in bringing about a use of libraries that has proved of great value to schools.

MODERN PERSPECTIVE; A TREATISE UPON THE PRINCIPLES AND PRACTICE OF PLANE AND CYLINDRICAL PERSPECTIVE. By William R. Wave. Boston: James R. Osgood & Co., 1883.

This volume contains, in revised form, a series of papers upon perspective which were contributed several years ago to the columns of the *American Architect and Building News*. The author discusses his subject in a different manner from that in which it is usually presented, much greater prominence being assigned to the phenomena of parallel planes than usual, and use being made of the laws thus established to determine the perspective of lines of intersection and of shadows—subjects that seem hitherto to have received but little attention. Throughout his work, Mr. Wave avoids a formal method of demonstration, and uses a somewhat conversational style, and endeavors to make the subject intelligible without employing the apparatus of theorem and problems.

A MANUAL OF CHEMICAL ANALYSIS AS APPLIED TO THE EXAMINATION OF MEDICINAL CHEMICALS. By Frederick Hoffmann, A.M., Ph.D., and Frederick B. Power, Ph.D. Philadelphia: Henry C. Lea's Son & Co., 1883.

This work, now in its third edition, was projected by its authors to supply a want long felt by phamacists, that of a special guide for ready reference in the application of chemical analysis to the examination of the medicinal chemicals of commerce. In the present edition, which has been thoroughly revised and to a large extent rewritten, in order to make it comply with the recently issued editions of the American and German Pharmacopœias, the general and original plan of the work has been retained, and the aim has been to render each article complete in text and illustrations, so as to avoid, as far as possible, references to other articles. The German, French, and Spanish names have been added, as have also a large number of new illustrations of apparatus and forms of crystals.

CUTTING TOOLS WORKED BY HAND AND MACHINE. By Robert H Smith, M.I.M.E. London, Paris, and New York: Cassell, Petter & Galpin.

This does not pretend to be a descriptive treatise on tools, but is intended as an educational work, and an attempt to begin the elevation of the art of tool making from its present entirely empirical to a more scientific position. It is intended, in fact, to guide the mechanical student into a correct, scientific way of thinking about tools, so that he may be able, aided by practice, to judge intelligently whether a tool is good or bad, to criticise its details, and eventually to design new tools scientifically. The work is clearly written, well illustrated, and will undoubtedly prove of great value to every student in mechanics.

EIGHTH ANNUAL REPORT OF PARDUE UNIVERSITY. Indianapolis: W. B. Buford.

This pamphlet contains the reports of the various officers and professors of the University for the college year ending June 30, 1882. It shows the institution to be in a prosperous condition and to be doing excellent educational work.

THE HOTEL FISH AND OYSTER COOK. By Jessup Whitehead. Chicago, 1882.

This volume forms No. 2 of the author's "Oven and Range Series" of cook books, and gives all the best methods of cooking oysters and fish for hotel and restaurant services, together with recipes for the appropriate sauces, etc.

ELECTRICITY IN MEDICINE AND SURGERY. By George C. Pitzer, M.D. St. Louis, 1883.

The object of this work is to furnish medical students with information in regard to the principal facts embraced in the subjects of electricity and electro therapeutics, and to present the matter so plainly that a novice may, with aid of this book, begin the treatment of disease by electrical means. The work is clearly expressed, well illustrated, and will undoubtedly supply a want that has long been felt by country practitioners.

THUCYDIDES: TRANSLATED INTO ENGLISH WITH INTRODUCTION, MARGINAL ANALYSIS, AND INDEX. By B. Jowett, M.A. Edited, with preface to the American edition, by A. P. Peabody, D.D. Boston: D. Lothrop & Co.

The text used as the basis of the present translation of the old Greek historian is that of Poppo's edition, the first volume of which appeared in 1815, and the last in 1856. Professor Jowett remarks in the introduction that "if Greek literature is not to pass away, it seems to be necessary that in every age some one who has drunk deeply from the original fountain should renew the love of it in the world, and once more present that old life with its great ideas and great actions, its creations in politics and in art, like the distant remembrance of youth, before the delighted eyes of mankind." The American editor indorses this view very warmly, and pays a deserved tribute to the translator, whose eminent fitness for the task he has performed is acknowledged by all Hellenists. This is a magnificent edition. From a typographical point of view, the work is a model of book making; the type is beautifully clear cut and distinct, and the paper and binding all excellent. An exhaustive index adds greatly to the value of the work.

Notes & Queries

HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from $1 to $5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at this office. Price 10 cents each.

Correspondents sending samples of minerals, etc., for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their identification.

(1) C. W. H.—If calf kid begins to look reddish and rusty, give it a slight application of oil, which will probably restore the colors, but if not, put on blacking. When the blacking has dried, brush it off, and go over it again very lightly with oil, when it will be as good as new. Patent leather will not only be made softer, but the luster will also be improved by oiling. For pebbled calf, or any kind of grain leather that has become brown, apply the same. When only a little red, an application of oil or tallow will often restore the color. When it is very brown, black it thoroughly, and oil it afterward, giving it a nice dressing of dissolved gum tragacanth to finish.

(2) J. W.—When flour is mixed with yeast or moistened, with water and placed in a warm situation, spontaneous chemical action begins in the nitrogenous constituents, casein, glutin, fibrin, etc. This change extends later to the sugar, gum, and starch. In this way vinous fermentation is induced, yielding alcohol and carbonic acid (the latter causing the bread to rise); at a later stage lactic fermentation sets in, giving rise to lactic acid. Such in brief is the chemical action that takes place, generally called fermentation. Consult "Theory and Practice in Bread Making," SCIENTIFIC AMERICAN SUPPLEMENT, No. 170, page 2702.

(3) G. F. T. writes: Please tell me in the SCIENTIFIC AMERICAN what size boiler it would take to run a one-twentieth horse power, cylinder one and a half inch bore, 2 inches stroke, balance wheel 8 inches in diameter and weighs 10 lb., and single acting. What shall I make the boiler of? A. You will need about 1 foot of heating surface for your one-twentieth horse power. A small coil of 1 inch iron pipe 3 or 4 turns about 6 inches diameter, inside of a stove or small furnace makes a very good working boiler. Place the coil above the fire, feed at the bottom. You may also connect the top and bottom outside of the stove with a small pipe and water gauge; make the water line at about half the height of the coil.

(4) C. V. N. asks: 1. What lubricant is there, *not liquid*, that is not affected by a solution of alum or soda and that does not attack brass when placed on cotton packing in contact with it for a length of time, and that does not set if not used? A. Graphite. 2. Is cosmoline changed by long exposure to the air or water? Has it been used as a lubricant? A. Cosmoline is not affected by long exposure to the air or water. It is too expensive to be used as a lubricator.

(5) C. C. F. asks how to temper steel plow points so as to last the longest without sharpening and with but little expense. I have tried receipts to temper mill picks, and salt, etc., but they are not satisfactory. What we need here is something that will make steel as near the hardness of a diamond as possible, as this soil wears points as fast as if held on a grindstone. A. If the steel is good, you will need nothing better than good clear water with perhaps a little salt in it. Harden at as low a heat as the steel will bear, and do not draw the temper for blunt tools for cutting stone. Heat your plow points in the same manner. The great trouble with plow points is in the poor quality of the steel. You may make the plow points better by case hardening; which every blacksmith knows how to do, and harden at a low heat without drawing the temper.

(6) M. G.—Flint glass is made of silex or clear white sand, soda, and oxide of lead in various proportions to suit the requirements of the trade. For crown glass the lead is left out. Eyepiece lenses are generally made of crown or plate glass.

(7) E. F. N. writes: I wish some information concerning the canning of corn and tomatoes for market. In SCIENTIFIC AMERICAN for October 28, 1882, you state that chloride of lime or of sodium, added to the water, will shorten the time required for boiling, but you do not state what amount is used nor how much the time is shortened. Is there any work on the subject of canning which I can purchase? We canned tomatoes for market (in a small way), but we perforated the tops before boiling. They kept well. A. The addition of salt or calcium chloride raises the boiling point and so shortens the time required for boiling. The time cannot be exactly stated, as it is dependent upon the amount added. Try adding a pound of salt to a gallon of water. There is no book on the subject.

(8) A. G. G. asks: What are the ingredients of "Spencer" acid, used in various processes of steel engraving and relief etching? A. Spencer's acid consists of 1 ounce pure granulated silver dissolved in pure nitric acid and one ounce mercury nitrate dissolved in some hot water; dilute to desired strength.

(9) G. M. asks: Can you give me the particulars as to the manufacture of sugar from milk? A. Milk sugar is prepared by heating milk with an acid or rennet, separating the curd, filtering through animal charcoal, if necessary, and evaporating to point of crystallization. It occurs in commerce as elongated crystalline masses. For further particulars consult Spons' Encyclopedia (page 1903).

COMMUNICATIONS RECEIVED.

On Latent Heat. By E. A. L.
On Torpedo. By W. F. H.
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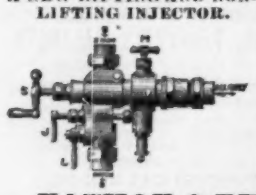

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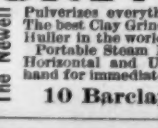
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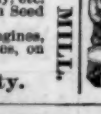
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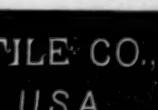
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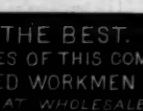
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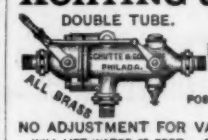

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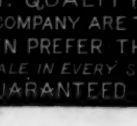

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